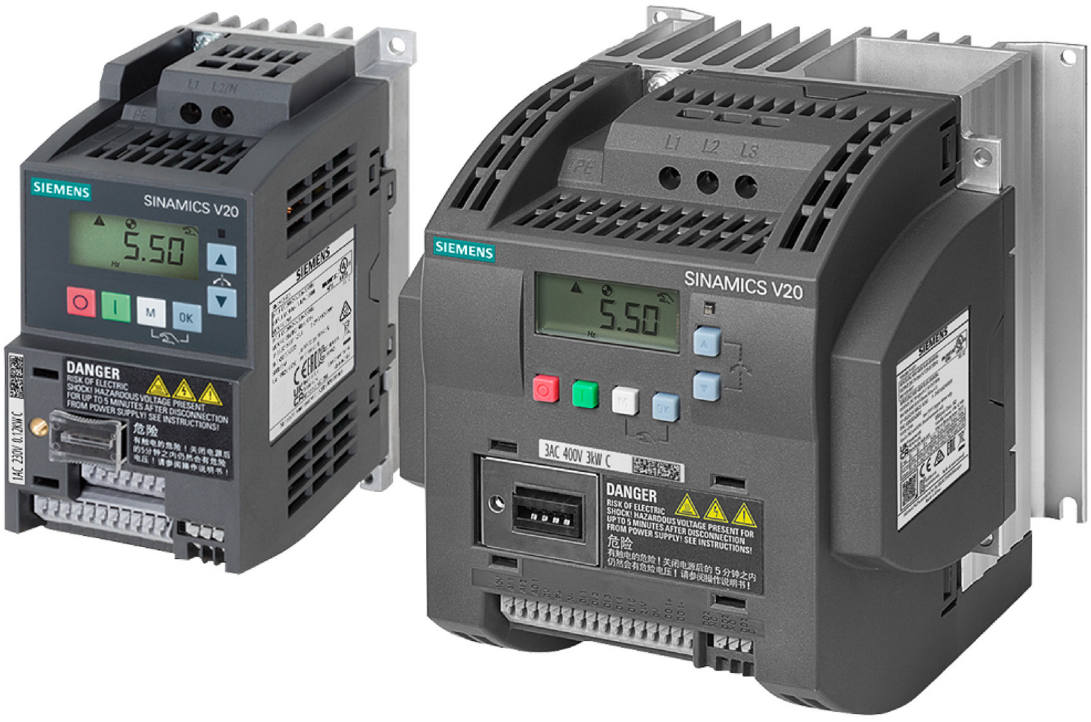

Edition 12/2024

OPERATING INSTRUCTIONS

SINAMICS

V20

Low voltage converters
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Parameter list

8

8.1 Introduction to parameters

Parameter number

Numbers prefixed with an "r" indicate that the parameter is a "read-only" parameter.

Numbers prefixed with a "P" indicate that the parameter is a "writable" parameter.

[index] indicates that the parameter is an indexed parameter and specifies the range of indices available. If the index is [0...2] and the meaning is not listed, then see "Data set".

.0...15 indicates that the parameter has several bits, which can be evaluated or connected individually.

Data set

Note

The "Index" chapter at the end of this manual provides complete lists of CDS/DDS parameters.

In the converter, the parameters which are used to define the sources for commands and setpoints are combined in the **Command Data Set** (CDS), while the parameters for the open and closed-loop control of the motor are combined in the **Drive Data Set** (DDS).

The converter can be operated from different signal sources by switching over the command data sets. When switching over the drive data sets, it is possible to switch between different converter configurations (control type, motor).

Three independent settings are possible for each data set. These settings can be made using the index [0...2] of the particular parameter.

Index	CDS	DDS
[0]	Command data set 0	Drive data set 0
[1]	Command data set 1	Drive data set 1
[2]	Command data set 2	Drive data set 2

SINAMICS V20 has an integrated copy function which is used to transfer data sets. This can be used to copy CDS/DDS parameters corresponding to the particular application.

Copy CDS	Copy DDS	Remarks
P0809[0]	P0819[0]	The data set which is to be copied (source)
P0809[1]	P0819[1]	The data set into which data is to be copied (target)
P0809[2]	P0819[2]	= 1: Start copying
		= 0: Copying completed

For example, copying of all values from CDS0 to CDS2 can be accomplished by the following procedure:

1. Set P0809[0] = 0: copy from CDS0
2. Set P0809[1] = 2: copy to CDS2
3. Set P0809[2] = 1: start copy

Command data set

The command data sets are changed over using the BICO parameters P0810 and P0811, whereby the active command data set is displayed in parameter r0050. Changeover is possible in both the "Ready" and the "Run" states.

P0810 = 0 P0811 = 0	CDS0
P0810 = 1 P0811 = 0	CDS1
P0810 = 0 or 1 P0811 = 1	CDS2

Drive data set

The drive data sets are changed over using the BICO parameters P0820 and P0821, whereby the active drive data set is displayed in parameter r0051. Drive data sets can only be changed over in the "Ready" state.

P0820 = 0 P0821 = 0	DDS0
P0820 = 1 P0821 = 0	DDS1
P0820 = 0 or 1 P0821 = 1	DDS2

BI, BO, CI, CO, CO/BO in parameter names

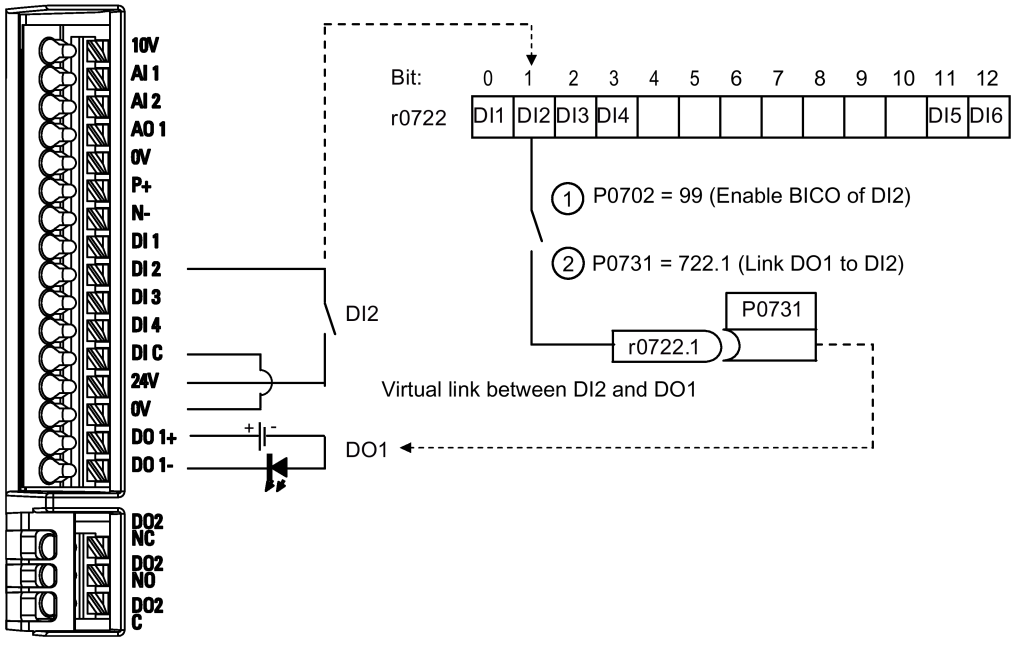
Note

The "Index" chapter at the end of this manual provides groups of the BICO parameters.

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

BI	=	P9999 (0)	Binector input: Parameter selects the source of a binary signal Each BI parameter can connect as the input to any BO or CO/BO parameter.
BO	=	r9999	Binector output: Parameter connects as a binary signal Each BO parameter can connect as the output to any BI parameter.
CI	=	P9999 (0)	Connector input: Parameter selects the source of an analog signal Each CI parameter can connect as the input to any CO or CO/BO parameter.
CO	=	r9999 [99]	Connector output: Parameter connects as an analog signal Each CO parameter can connect as the output to any CI parameter.
CO/BO	=	r9999 r9999	Connector/binector output: Parameter connects as an analog signal and/or as a binary signal Each CO/BO parameter can connect as the output to any BI or CI parameter.

BICO example



BICO or the binary interconnection technology can help the user to connect internal function and values to realize more customized features.

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, access 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 (converter current, frequency, analog output, digital outputs, etc.).

The default parameter that a BI or CI parameter is connected to is shown in the Factory default column of the parameter list.

Access level (P0003)

Defines the level of user access to parameter sets.

Access level	Description	Remarks
0	User-defined parameter list	Defines a limited set of parameters to which the end user has access. See P0013 for details on use.
1	Standard	Allows access into most frequently used parameters.
2	Extended	Allows extended access to more parameters.
3	Expert	For expert use only.
4	Service	Only for use by authorized service personnel, password protected.

Data type

The data types available are shown in the table below.

U8	8-bit unsigned
U16	16-bit unsigned
U32	32-bit unsigned
I16	16-bit integer
I32	32-bit integer
Float	32-bit floating point number

Depending on the data type of the BICO input parameter (signal sink) and BICO output parameter (signal source) the following combinations are possible when creating BICO interconnections:

	BICO input parameter			
	CI parameter			**BI parameter**
BICO output parameter	**U32/I16**	**U32/I32**	**U32/Float**	**U32/Bin**
CO: U8	√	√	-	-
CO: U16	√	√	-	-
CO: U32	√	√	-	-
CO: I16	√	√	-	-
CO: I32	√	√	-	-
CO: Float	√	√	√	-
BO: U8	-	-	-	√
BO: U16	-	-	-	√
BO: U32	-	-	-	√
BO: I16	-	-	-	√
BO: I32	-	-	-	√
BO: Float	-	-	-	-
Legend: √: BICO interconnection permitted -: BICO interconnection not permitted				

Scaling

Specification of the reference quantity with which the signal value will be converted automatically.

Reference quantities, corresponding to 100 %, are required for the statement of physical units as percentages. These reference quantities are entered in P2000 to P2004.

In addition to P2000 to P2004 the following normalizations are used:

- TEMP: 100 °C = 100 %
- PERCENT: 1.0 = 100 %
- 4000H: 4000 hex = 100 %

Can be changed

Converter state in which the parameter is changeable. Three states are possible:

- Commissioning: C, C(1) or C(30)
- 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 converter states. C shows the parameter is changeable whatever P0010 equals; C(1) shows that the parameter is changeable only when P0010 = 1; C(30) shows that the parameter is changeable only when P0010 = 30.

8.2 Parameter list

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
r0002	**Converter state**	-	-	-	-	-	U16	2
	Displays actual converter state.							
	0	Commissioning mode (P0010 ≠ 0)						
	1	Converter ready						
	2	Converter fault active						
	3	Converter starting (visible only while pre-charging DC link)						
	4	Converter running						
	5	Stopping (ramping down)						
	6	Converter inhibited						
P0003	**User access level**	0 - 4	1	U, T	-	-	U16	1
	Defines user access level to parameter sets.							
	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, for example, to converter I/O functions						
	3	Expert: For expert use only						
	4	Service: Only for use by authorized service, password protected						
P0004	**Parameter filter**	0 - 24	0	U, T	-	-	U16	1
	Filters parameters according to functionality to enable a more focused approach to commissioning.							
	0	All parameters						
	2	Converter						
	3	Motor						
	5	Technology application/units						
	7	Commands, binary I/O						
	8	Analog input and analog output						
	10	Setpoint channel/RFG						
	12	Converter features						
	13	Motor control						
	19	Motor identification						
	20	Communication						
	21	Warnings/faults/monitoring						
	22	Technology controller						
	24	List of modified parameters						
P0005	**Parameter display selection**	0 - 9580	0	C, U, T	-	-	U16	2
	Selects default display parameter (converter display).							
Example:	The converter displays the value of the parameter selected here by default.							
Notice:	If you have set P0005 to a non-zero value which represents an actual parameter number, then the converter displays the value of the selected parameter as the default display value; if you have set P0005 to 0 or a non-zero value which does not represent an actual parameter number, then the default display remains unchanged.							
Note:	If you set P0005 = 22, the converter displays the actual filtered rotor speed (r0022). When you press ▲ or ▼ to change the speed of the motor in RUN mode, the displayed unit of the actual filtered rotor speed automatically changes from 1/min to Hz for checking and calculation. You can press OK to view the updated speed value in 1/min.							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P0007	**Backlight delay time**	0 - 2000	0	U, T	-	-	U16	3
	Defines time period after which the backlight of the operator panel display turns off if no buttons have been pressed.							
	0	Backlight always on						
	1 - 2000	Number of seconds after which the backlight turns off.						
P0010	**Commissioning parameter**	0 - 30	0	T	-	-	U16	1
	Filters parameters so that only those related to a particular functional group are selected.							
	0	Ready						
	1	Quick commissioning						
	2	Converter						
	29	Only for internal Siemens use						
	30	Factory setting						
Dependency:	Reset to 0 for converter to run. P0003 (user access level) also determines access to parameters.							
Note:	• P0010 = 1 The converter 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. Afterwards parameter P0010 and P3900 will be reset to zero automatically. • P0010 = 2 For service purposes only. • P0010 = 30 When resetting the parameters or user default values of converter P0010 must be set to 30. Resetting of the parameters will be started by setting parameter P0970 = 1. The converter 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. Resetting of the user default values will be started by setting parameter P0970 = 21. The converter will automatically reset all its parameters to the factory default settings. Duration of factory setting will take several seconds. Resetting of the user default values in EEPROM will be started by setting parameter P0970 = 31 (special factory reset). The converter will automatically reset all its parameters in EEPROM to the factory default settings. Duration of factory setting will take several seconds.							
P0011	**Lock for user-defined parameter**	0 - 65535	0	U, T	-	-	U16	3
	See P0013							
P0012	**Key for user-defined parameter**	0 - 65535	0	U, T	-	-	U16	3
	See P0013							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P0013[0...19]	**User-defined parameter**	0 - 65535	[0...16] 0 [17] 3 [18] 10 [19] 12	U, T	-	-	U16	3
	Defines a limited set of parameters to which the end user has 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 17 = 3 (user access level) - P0013 index 18 = 10 (commissioning parameter filter) - P0013 index 19 = 12 (key for user defined parameter) 4. Set P0003 = 0 to activate the user defined parameter.							
Index:	[0]	1st user parameter						
	[1]	2nd user parameter						
	...	...						
	[19]	20th user parameter						
Dependency:	First, set P0011 ("lock") to a different value then 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").							
P0014[0...2]	**Store mode**	0 - 1	0	U, T	-	-	U16	3
	Sets the store mode for parameters. The store mode can be configured for all interfaces under "Index".							
	0	Volatile (RAM)						
	1	Non-volatile (EEPROM)						
Index:	[0]	USS/Modbus on RS485						
	[1]	USS on RS232 (reserved)						
	[2]	Reserved						
Note:	An independent store request may be part of the serial communications (for example, PKE bits 15-12 of USS protocol). See the table below for an influence on the settings of P0014.							
	Value of P0014 [x]	**Store request via USS**				**Result**		
	RAM	EEPROM				EEPROM		
	EEPROM	EEPROM				EEPROM		
	RAM	RAM				RAM		
	EEPROM	RAM				EEPROM		
	1. P0014 itself will always be stored in the EEPROM. 2. P0014 will not be changed by performing a factory reset. When transferring parameter P0014, the converter uses its processor to carry-out internal calculations. Communications - both via USS as well as Modbus - are interrupted for the time that it takes to make these calculations.							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P0016	**Parameter editing lock on BOP**	0 - 1	0	C, U, T	-	-	U16	3
	Prevents parameter editing on the BOP.							
	0	Enable parameter editing on BOP (immediately effective)						
	1	Disable parameter editing on BOP (effective only after converter power-cycle)						
Note:	In addition to enabling parameter editing with P0016=0, you can alternatively use the BOP buttons to enable the editing. Long-press OK (> 2 s), wait until "ULOC?" appears on the BOP display, and then press M. The unlocking becomes effective immediately.							
r0017	**CO/BO: BOP button status**	-	-	-	-	-	U16	3
	Shows the immediate status of the BOP buttons.							
	Bit	**Signal name**			**1 signal**		**0 signal**	
	00	Run button			Yes		No	
	01	Stop button			Yes		No	
	02	HAND/AUTO button combination (OK + M)			Yes		No	
	03	OK button			Yes		No	
	05	Up button			Yes		No	
	06	Down button			Yes		No	
	07	Run/stop latch			Yes		No	
Note:	Bit 07 (ON/OFF), will remain high if the run button has been pressed and released. It will only be reset once the stop button has been pressed.							
r0018	**Firmware version**	-	-	-	-	-	Float	1
	Displays version number of installed firmware.							
r0019.0...14	**CO/BO: Operator panel control word**	-	-	-	-	-	U16	3
	Displays status of operator panel commands. The settings below are used as the "source" codes for keypad control when connecting to BICO input parameters.							
	Bit	**Signal name**			**1 signal**		**0 signal**	
	00	ON/OFF1			Yes		No	
	01	OFF2: Electrical stop			No		Yes	
	08	JOG right			Yes		No	
	11	Reverse (setpoint inversion)			Yes		No	
	13	Motor potentiometer MOP up			Yes		No	
	14	Motor potentiometer MOP down			Yes		No	
Note:	When BICO technology is used to allocate functions to panel buttons, this parameter displays the actual status of the relevant command.							
r0020	**CO: Frequency setpoint before RFG [Hz]**	-	-	-	-	-	Float	3
	Displays actual frequency setpoint (input of ramp function generator). This value is available filtered (r0020) and unfiltered (r1119). The actual frequency setpoint after RFG is displayed in r1170.							
r0021	**CO: Actual filtered frequency [Hz]**	-	-	-	-	-	Float	2
	Displays actual converter output frequency (r0024) excluding slip compensation (and resonance damping, frequency limitation in V/f mode).							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
r0022	**Actual filtered rotor speed [RPM]**	-	-	-	-	-	Float	3
	Displays calculated rotor speed based on r0021 (filtered output frequency [Hz] x 120/number of poles). The value is updated every 128 ms.							
Note:	This calculation makes no allowance for load-dependent slip.							
r0024	**CO: Actual filtered output frequency [Hz]**	-	-	-	-	-	Float	3
	Displays actual filtered output frequency (slip compensation, resonance damping and frequency limitation are included). See also r0021. This value is available filtered (r0024) and unfiltered (r0066).							
r0025	**CO: Actual output voltage [V]**	-	-	-	-	-	Float	2
	Displays filtered [rms] voltage applied to motor. This value is available filtered (r0025) and unfiltered (r0072).							
r0026[0]	**CO: Actual filtered DC-link voltage [V]**	-	-	-	-	-	Float	2
	Displays filtered DC-link voltage. This value is available filtered (r0026) and unfiltered (r0070).							
Index:	[0]	Compensation DC voltage channel						
Note:	r0026[0] = Main DC-link voltage For more about the DC-link voltage threshold values, see P0210.							
r0027	**CO: Actual output current [A]**	-	-	-	P2002	-	Float	2
	Displays rms value of motor current. This value is available filtered (r0027) and unfiltered (r0068).							
r0028	**CO: Motor current modulus**	-	-	-	P2002	-	Float	3
	Displays estimated rms value of motor current calculated from dclink current.							
r0031	**CO: Actual filtered torque [Nm]**	-	-	-	-	-	Float	2
	Displays electrical torque. This value is available filtered (r0031) and unfiltered (r0080).							
Note:	The electrical torque is not the same as the mechanical torque, which can be measured on the shaft. Due to windage and friction a part of the electrical torque is lost in the motor.							
r0032	**CO: Actual filtered power**	-	-	-	r2004	-	Float	2
	Displays (mechanical) shaft power. Value is displayed in [kW] or [hp] depending on setting for P0100 (operation for Europe/North America). P_mech = 2 * Pi * f * M -->r0032[kW] = (2 * Pi/1000) * (r0022/60)[1/min] * r0031[Nm] r0032[hp] = r0032[kW]/0.75							
r0035[0...2]	**CO: Actual motor temperature [°C]**	-	-	-	-	DDS	Float	2
	Displays calculated motor temperature.							
r0036	**CO: Converter overload utilization [%]**	-	-	-	PERCENT	-	Float	3
	Displays converter overload utilization calculated via the I^2t model. The actual I^2t value relative to the maximum possible I^2t value supplies utilization in [%]. If the current exceeds the threshold for P0294 (converter I^2t overload warning), warning A505 (converter I^2t) is generated and the output current of the converter reduced via P0290 (converter overload reaction). If 100 % utilization is exceeded, fault F5 (converter I^2t) is tripped.							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
r0037[0...1]	**CO: Converter temperature [°C]**	-	-	-	-	-	Float	3
	Displays measured heat sink temperature and calculated junction temperature of IGBTs based on thermal model.							
Index:	[0]	Measured heat sink temperature						
	[1]	Total Chip Junction Temperature						
Note:	The values are updated every 128 ms.							
r0038	**CO: Filtered power factor**	-	-	-	-	-	Float	3
	Displays the filtered power factor.							
r0039	**CO: Energy consumpt. meter [kWh]**	-	-	-	-	-	Float	2
	Displays electrical energy used by converter since display was last reset (see P0040 - reset energy consumption meter).							
Dependency:	Value is reset when P0040 = 1 (reset energy consumption meter).							
P0040	**Reset energy consumpt. and energy saved meter**	0 - 1	0	T	-	-	U16	2
	Resets value of r0039 (energy consumption meter) and r0043 (energy saved meter) to zero.							
	0	No reset						
	1	Reset r0039 to 0						
P0042[0...1]	**Energy saving scaling**	0.000 - 100.00	0.000	T	-	-	Float	2
	Scales the calculated energy saved value							
Index:	[0]	Factor for kWh to currency conversion						
	[1]	Factor for kWh to CO2 conversion						
r0043[0...2]	**Energy saved [kWh]**	-	-	-	-	-	Float	2
	Displays calculated energy saved							
Index:	[0]	Energy saving in kWh						
	[1]	Energy saving in currency						
	[2]	Energy saving in CO2						
r0050	**CO/BO: Active command data set**	-	-	-	-	-	U16	2
	Displays currently active command data set.							
	0	Command data set 0 (CDS)						
	1	Command data set 1 (CDS)						
	2	Command data set 2 (CDS)						
Note:	See P0810							
r0051[0...1]	**CO: Active drive data set (DDS)**	-	-	-	-	-	U16	2
	Displays currently selected and active drive data set (DDS).							
	0	Drive data set 0 (DDS0)						
	1	Drive data set 1 (DDS1)						
	2	Drive data set 2 (DDS2)						
Index:	[0]	Selected drive data set						
	[1]	Active drive data set						
Note:	See P0820							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
r0052.0...15	**CO/BO: Active status word 1**	-	-	-	-	-	U16	2
	Displays first active status word of converter (bit format) and can be used to diagnose converter status.							
	Bit	**Signal name**			**1 signal**		**0 signal**	
	00	Converter ready			Yes		No	
	01	Converter ready to run			Yes		No	
	02	Operation enabled			Yes		No	
	03	Converter fault active			Yes		No	
	04	OFF2 active			No		Yes	
	05	OFF3 active			No		Yes	
	06	ON inhibit active			Yes		No	
	07	Converter warning active			Yes		No	
	08	Deviation setpoint/act. value			No		Yes	
	09	PZD control			Yes		No	
	10	|f_act| >= P1082 (f_max)			Yes		No	
	11	Warning: Motor current/torque limit			No		Yes	
	12	Brake open			Yes		No	
	13	Motor overload			No		Yes	
	14	Motor runs right			Yes		No	
	15	Converter overload			No		Yes	
Dependency:	r0052 bit 03 "Converter fault active": Output of bit 3 (Fault) will be inverted on digital output (Low = Fault, High = No Fault); r0052 bit 06 "On inhibit" is active with OFF2 or OFF3 and becomes disabled with OFF1, NOT OFF2 and NOT OFF3.							
Note:	See r2197 and r2198. For information about the state diagram after power-on and the ON/OFF1 command, see the FAQ (https://support.industry.siemens.com/cs/ww/en/view/109795851) provided on the Internet.							
r0053.0...11	**CO/BO: Active status word 2**	-	-	-	-	-	U16	2
	Displays second status word of converter (in bit format).							
	Bit	**Signal name**			**1 signal**		**0 signal**	
	00	DC brake active			Yes		No	
	01	|f_act| > P2167 (f_off)			Yes		No	
	02	|f_act| > P1080 (f_min)			Yes		No	
	03	Act. current |r0068| >= P2170			Yes		No	
	04	|f_act| > P2155 (f_1)			Yes		No	
	05	|f_act| <= P2155 (f_1)			Yes		No	
	06	f_act >= setpoint (f_set)			Yes		No	
	07	Act. unfilt. Vdc < P2172			Yes		No	
	08	Act. unfilt. Vdc > P2172			Yes		No	
	09	Ramping finished			Yes		No	
	10	PID output r2294 == P2292 (PID_min)			Yes		No	
	11	PID output r2294 == P2291 (PID_max)			Yes		No	
Notice:	r0053 bit 00 "DC brake active" ==> see P1233							
Note:	See r2197 and r2198.							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
r0054.0...15	**CO/BO: Active control word 1**	-	-	-	-	-	U16	3
	Displays first control word of converter (in bit format) and can be used to diagnose which commands are active.							
	Bit	**Signal name**			**1 signal**		**0 signal**	
	00	ON/OFF1			Yes		No	
	01	OFF2: electrical stop			No		Yes	
	02	OFF3: fast stop			No		Yes	
	03	Pulse enable			Yes		No	
	04	RFG enable			Yes		No	
	05	RFG start			Yes		No	
	06	Setpoint enable			Yes		No	
	07	Fault acknowledge			Yes		No	
	08	JOG right			Yes		No	
	09	JOG left			Yes		No	
	10	Control from PLC			Yes		No	
	11	Reverse (setpoint inversion)			Yes		No	
	13	Motor potentiometer MOP up			Yes		No	
	14	Motor potentiometer MOP down			Yes		No	
	15	CDS Bit 0 (Hand/Auto)			Yes		No	
Notice:	r0054 is identical to r2036 if USS is selected as command source via P0700 or P0719.							
r0055.0...15	**CO/BO: Active control word 2**	-	-	-	-	-	U16	3
	Displays additional control word of converter (in bit format) and can be used to diagnose which commands are active.							
	Bit	**Signal name**			**1 signal**		**0 signal**	
	00	Fixed frequency Bit 0			Yes		No	
	01	Fixed frequency Bit 1			Yes		No	
	02	Fixed frequency Bit 2			Yes		No	
	03	Fixed frequency Bit 3			Yes		No	
	04	Drive data set (DDS) Bit 0			Yes		No	
	05	Drive data set (DDS) Bit 1			Yes		No	
	06	Quick stop disable			Yes		No	
	08	Enable PID			Yes		No	
	09	Enable DC brake			Yes		No	
	13	External fault 1			No		Yes	
	15	Command data set (CDS) Bit 1			Yes		No	
Notice:	r0055 is identical to r2037 if USS is selected as command source via P0700 or P0719.							

Parameter	Function		Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
r0056.0...15	**CO/BO: Status of motor control**		-	-	-	-	-	U16	3
	Displays status of motor control (in bit format), which can be used to diagnose converter status.								
	Bit	**Signal name**				**1 signal**		**0 signal**	
	00	Init. control finished				Yes		No	
	01	Motor demagnetizing finished				Yes		No	
	02	Pulses enabled				Yes		No	
	03	Voltage soft start select				Yes		No	
	04	Motor excitation finished				Yes		No	
	05	Starting boost active				Yes		No	
	06	Acceleration boost active				Yes		No	
	07	Frequency is negative				Yes		No	
	08	Field weakening active				Yes		No	
	09	Volts setpoint limited				Yes		No	
	10	Slip frequency limited				Yes		No	
	11	f_out > f_max Freq. limited				Yes		No	
	12	Phase reversal selected				Yes		No	
	13	Imax controller active/torque limit reached				Yes		No	
	14	Vdc_max controller active				Yes		No	
	15	KIB (Vdc_min control) active				Yes		No	
Notice:	The I-max controller (r0056 bit 13) will be activated when the actual output current (r0027) exceeds the current limit in r0067.								
r0066	**CO: Actual output frequency [Hz]**		-	-	-	-	-	Float	3
	Displays actual output frequency in Hz. This value is available filtered (r0024) and unfiltered (r0066).								
Note:	The output frequency is limited by the values entered in P1080 (minimum frequency) and P1082 (maximum frequency).								
r0067	**CO: Actual output current limit [A]**		-	-	-	P2002	-	Float	3
	Displays valid maximum output current of converter. r0067 is influenced/determined by the following factors: • Converter application P0205 • Rated motor current P0305 • Motor overload factor P0640 • Motor protection in dependency of P0610 • r0067 is less than or equal to maximum converter current r0209 • Converter protection in dependency of P0290								
Note:	A reduction of r0067 may indicate a converter overload or a motor overload.								
r0068	**CO: Output current [A]**		-	-	-	P2002	-	Float	3
	Displays unfiltered [rms] value of motor current. This value is available filtered (r0027) and unfiltered (r0068).								
Note:	Used for process control purposes (in contrast to r0027, which is filtered and is used to display the value through USS).								

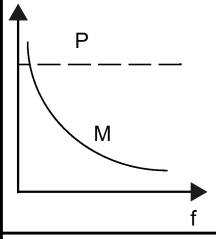
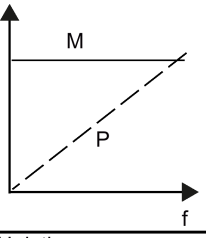
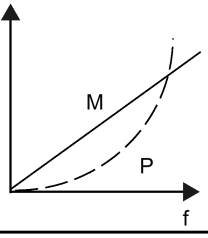
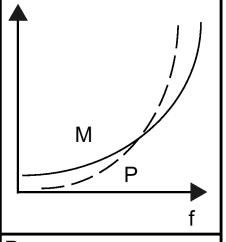
Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
r0069[0...5]	**CO: Actual phase currents [A]**	-	-	-	P2002	-	Float	4
	Displays measured phase currents.							
Index:	[0]	U_Phase/ Emitter1/						
	[1]	Dclink/Emitter2						
	[2]	Dclink						
	[3]	Offset U_phase/Emitter						
	[4]	Offset dclink						
	[5]	Not used						
r0070	**CO: Actual DC-link voltage [V]**	-	-	-	-	-	Float	3
	Displays DC-link voltage. This value is available filtered (r0026) and unfiltered (r0070).							
Note:	Used for process control purposes (in contrast to r0026 (actual DC-link voltage), which is filtered).							
r0071	**CO: Maximum output voltage [V]**	-	-	-	-	-	Float	3
	Displays maximum output voltage.							
Dependency:	Actual maximum output voltage depends on the actual input supply voltage.							
r0072	**CO: Actual output voltage [V]**	-	-	-	-	-	Float	3
	Displays output voltage. This value is available filtered (r0025) and unfiltered (r0072).							
r0074	**CO: Actual modulation [%]**	-	-	-	PERCENT	-	Float	4
	Displays actual modulation index. The modulation index is defined as ratio between the magnitude of the fundamental component in the converter phase output voltage and half of the DC-link voltage.							
r0078	**CO: Actual current Isq [A]**	-	-	-	P2002	-	Float	3
	Displays component of torque generating current.							
r0080	**CO: Actual torque [Nm]**	-	-	-	-	-	Float	4
	Displays actual torque. This value is available filtered (r0031) and unfiltered (r0080).							
r0084	**CO: Actual air gap flux [%]**	-	-	-	PERCENT	-	Float	4
	Displays air gap flux relative to the rated motor flux.							
r0085	**CO: Actual re-active current [A]**	-	-	-	P2002	-	Float	3
	Displays re-active (imaginary part) of motor current.							
Dependency:	Applies when V/f control is selected in P1300 (control mode); otherwise, the display shows the value zero.							
r0086	**CO: Actual active current [A]**	-	-	-	P2002	-	Float	3
	Displays active (real part) of motor current.							
Dependency:	See r0085							
r0087	**CO: Actual power factor**	-	-	-	-	-	Float	3
	Displays the actual power factor.							
r0094	**CO: Transformation angle [°]**	-	0.0	-	4000H	-	Float	3
	Displays the transformation angle (flux angle in VC mode or angle from frequency in Vf mode).							

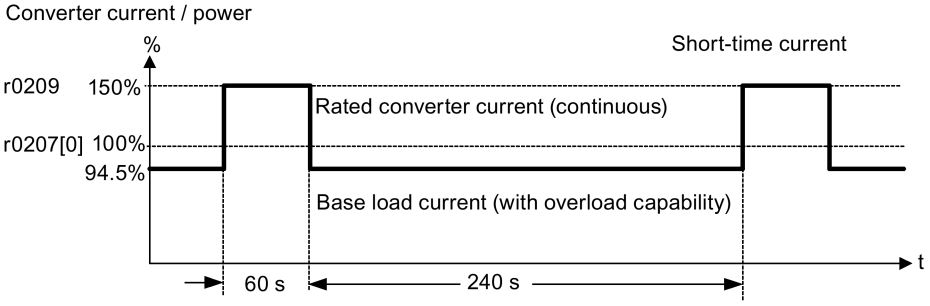
Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P0095[0...9]	**CI: Display PZD signals**	0 - 4294967295	0	T	4000H	-	U32	3
	Selects source of display for PZD signals.							
Index:	[0]	1st PZD signal						
	[1]	2nd PZD signal						
	...	...						
	[9]	10th PZD signal						
r0096[0...9]	**PZD signals [%]**	-	-	-	-	-	Float	3
	Displays PZD signals.							
Index:	[0]	1st PZD signal						
	[1]	2nd PZD signal						
	...	...						
	[9]	10th PZD signal						
Note:	r0096 = 100 % corresponds to 4000 hex.							
P0100	**Europe/North America**	0 - 2	0	C(1)	-	-	U16	1
	Determines whether the power settings are expressed in [kW] or [hp] (e.g. Rated motor power P0307). The default settings for the rated motor frequency P0310 and maximum frequency P1082 are set automatically here, in addition to reference frequency P2000.							
	0	Europe [kW], motor base frequency is 50 Hz						
	1	North America [hp], motor base frequency is 60 Hz						
	2	North America [kW], motor base frequency is 60 Hz						
Dependency:	Where: • Stop converter first (i.e. disable all pulses) before you change this parameter. • P0100 can only be changed with P0010 = 1 (Commissioning mode) via the respective interface (for example, USS). • 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).							
r0191[0...2]	**Configuration converter**	-	0	-	-	-	U32	4
	Displays the actual hardware configuration (SZL vector) of the converter.							
Index:	[0]	SZL vector of converter and power module						
	[1]	SZL vector of converter						
	[2]	SZL vector of power module						
P0199	**Equipment system number**	0 - 65535	0	U, T	-	-	U16	2
	Specifies the unique equipment system number for the converter.							
P0201[0...2]	**Actual power module code number**	0 - 65535	0	T	-	-	U16	3
	Identifies hardware variant.							
Index:	[0]	Converter code						
	[1]	Functionality version - last digit of the article number						
	[2]	Last used converter ID						
Notice:	Parameter P0201 = 0 indicates that no power module has been identified.							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
r0204	**Power module features**	-	0	-	-	-	U32	3
	Displays hardware features of power module.							
	Bit	**Signal name**			**1 signal**		**0 signal**	
	00	DC input voltage			Yes		No	
	01	RFI filter			Yes		No	
	02	Active line module			Yes		No	
	03	SLM			Yes		No	
	04	BLM with thyristor			Yes		No	
	05	BLM with diode			Yes		No	
	06	Water cooled			Yes		No	
	07	F3E converter			Yes		No	
	12	Safe brake			Yes		No	
	13	Safety enabled			Yes		No	
	14	Integrated output filter			Yes		No	
Note:	Parameter r0204 = 0 indicates that no power module has been identified.							
P0205	**Converter application**	0 - 1	0	C1	-	-	U16	3

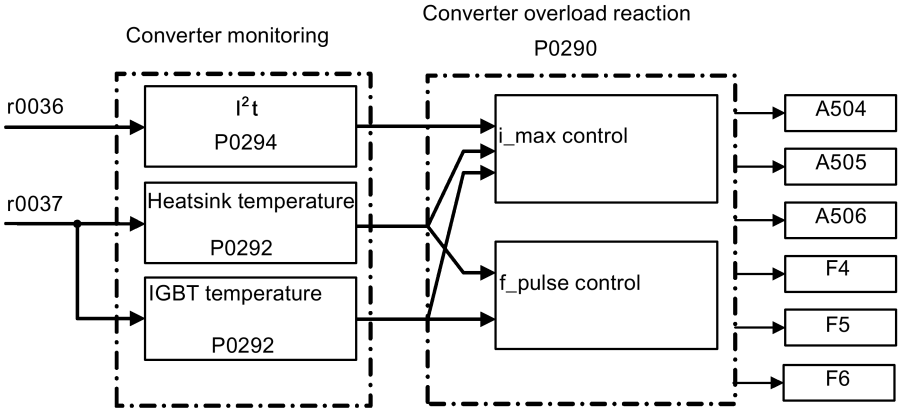
Selects a converter application.

The converter and motor requirements are determined by the speed range and torque requirements of the load. The relationship between speed and torque for different loads (high overloads or low overloads) is shown in the following figure:

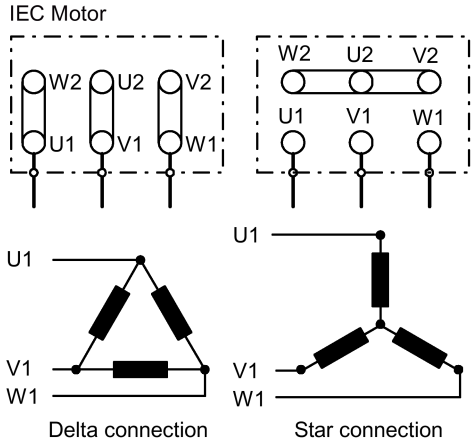
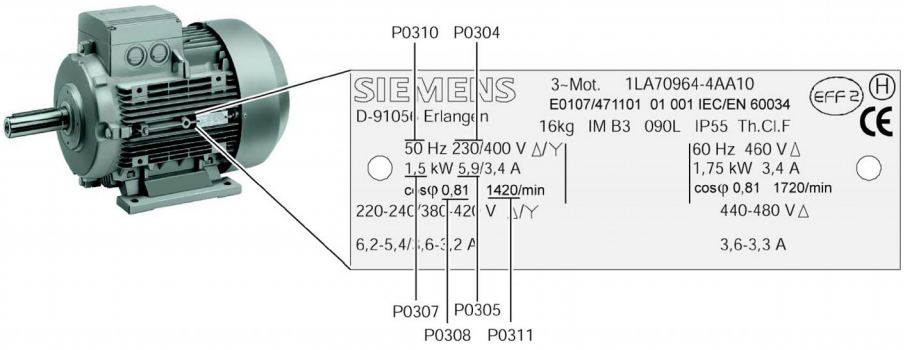
Torque	$M \sim \frac{1}{f}$	M = const.	M ~ f	$M \sim f^2$
Power	p = const.	p ~ f	$p \sim f^2$	$p \sim f^3$
Characteristic				
Application	Winders Facing lathes Rotary cutting machines	Hoisting gear Belt conveyors Process machines involving forming Rolling mills Planers Compressors	Calenders with viscous friction Eddy-current brakes	Pumps Fans Centrifuges

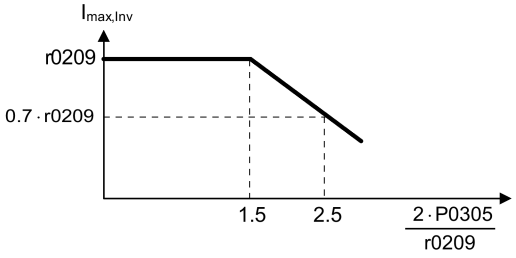
Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
	• High overload (HO): HO mode is used if the application needs a high overload on the whole frequency range. Many loads can be considered to be high overloads. Typical high overloads are conveyors, compressors and positive displacement pumps. • Low overload (LO): LO mode is used if the application has a parabolic frequency/torque characteristic like many fans and pumps. Low overload offers the following possibilities with the same converter: – Higher rated converter current r0207 – Higher rated converter power r0206 – Higher threshold for I2t protection If P0205 is modified in quick commissioning it immediately calculates various motor parameters: – P0305 Rated motor current – P0307 Rated motor power – P0640 Motor overload factor It is recommended to modify P0205 first. Afterwards motor parameter may be adapted. Motor parameter will be overridden by changing this sequence.							
Values:	0	High overload						
	1	Low overload						
Notice:	Use setting 1 (low overload) only for low-overload applications (for example, pumps and fans). If it is used for high-overload applications, I2t warning will be produced too late, causing overheating in the motor.							
Note:	This parameter selects converter application for FSE only. The parameter value is not reset by the factory setting (see P0970).							
r0206	**Rated converter power [kW]/[hp]**	-	-	-	-	-	Float	2
	Displays nominal rated motor power from converter.							
Dependency:	Value is displayed in [kW] or [hp] depending on setting for P0100 (operation for Europe/North America).							
r0207[0...2]	**Rated converter current [A]**	-	-	-	-	-	Float	2
	Displays rated converter current.							
Index:	[0]	Rated converter current						
	[1]	Rated LO current						
	[2]	Rated HO current						
Note:	The rated high overload (HO) current r0207[2] values correspond to suitable 4-pole Siemens standard motors (IEC) for the selected load cycle (see diagram). r0207[2] is the default value of P0305 in association with the HO application (load cycle). 							
r0208	**Rated converter voltage [V]**	-	-	-	-	-	U32	2
	Displays nominal AC supply voltage of converter.							
Note:	r0208 = 230: 200 V to 240 V (tolerance: -10% to +10%) r0208 = 400: 380 V to 480 V (tolerance: -15% to +10%)							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
r0209	**Maximum converter current [A]**	-	-	-	-	-	Float	2
	Display the maximum allowable output current of converter.							
Dependency:	In actual applications, Siemens recommends that you consider the output current derating affected by pulse frequency P1800, surrounding temperature and altitude. The data of derating is given in the Operating Instructions.							
P0210	**Supply voltage [V]**	380 - 480	400	T	-	-	U16	3
	P0210 defines the supply voltage. Its default value depends upon the type of converter. If P0210 does not correspond to the supply voltage, then it must be modified.							
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_min switch-on level (r1246) = P1245 * sqrt(2) * P0210 • Vdc_max switch-on level (r1242) = 1.15 * sqrt(2) * P0210 • Dynamic braking switch-on level = 1.13 * sqrt(2) * P0210 • Compound braking switch-on level = 1.13 * sqrt(2) * P0210 Set P1254 ("Auto detect Vdc switch-on levels") = 1. Cut-in levels for Vdc controller and compound braking are then derived from r0070 (DC-link voltage): • Vdc_min switch-on level (r1246) = P1245 * r0070 • Vdc_max switch-on level (r1242) = 1.15 * r0070 • Dynamic braking switch-on level = 0.98 * r1242 • Compound braking switch-on level = 0.98 * r1242 Auto-detection calculations are only performed when the converter has been in standby for over 20s. When pulses are enabled, the calculated values are frozen after pulses are ceased for 20s.							
Note:	For best results, it is recommended that auto-detection of Vdc switch-on levels (P1254 = 1) is used. Setting P1254 = 0 is only recommended when there is a high degree of fluctuation of the DC-link when the motor is being driven. In this case, ensure the setting of P0210 is correct. If mains voltage is higher than value entered, automatic deactivation of the Vdc controller may occur to avoid acceleration of the motor. A warning will be issued in this case (A910). Default value is depending on converter type and its rating data.							
r0231[0...1]	**Maximum cable length [m]**	-	-	-	-	-	U16	3
	Indexed parameter to display maximum allowable cable length between converter and motor.							
Index:	[0]	Maximum allowed unscreened cable length						
	[1]	Maximum 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.							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P0290	**Converter overload reaction**	0 - 3	2	T	-	-	U16	3
	Selects reaction of converter to an internal thermal overload condition.							
	0	Reduce output frequency and output current						
	1	No reduction, trip (F4/5/6) when thermal limits reached						
	2	Reduce pulse frequency, output current and output frequency						
	3	Reduce pulse frequency only and trip (F6) when overload too high						
Dependency:	Following physical values influence the converter overload protection (see diagram): • Heat sink temperature (r0037[0]); causes A504 and F4. • IGBT Junction temperature (r0037[1]); causes F4 or F6. • Delta temperature between heat sink and junction temperature; causes A504 and F6. • Converter I^2t (r0036); causes A505 and F5. 							
Notice:	P0290 = 0, 2: • Reduction of output frequency is only effective if the load is also reduced. This is for example valid for light overload applications with a quadratic torque characteristic as pumps or fans. • For settings P0290 = 0 or 2, the I-max controller will act upon the output current limit (r0067) in case of overtemperature. P0290 = 0: • With pulse frequencies above nominal, pulse frequency will be reduced to nominal immediately in the event of r0027 greater than r0067 (current limit). P0290 = 2, 3: • The pulse frequency P1800 is reduced only if higher than 2 kHz and if the operating frequency is below 2 Hz. • The actual pulse frequency is displayed in r1801[0] and the minimal pulse frequency for reduction is displayed in r1801[1]. • Converter I^2t acts upon output current and output frequency, but not on pulse frequency. A trip will always result, if the action taken does not sufficiently reduce internal temperatures.							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P0291[0...2]	**Converter protection**	0 - 7	1	U, T	-	DDS	U16	4
	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.							
	Bit	**Signal name**			**1 signal**		**0 signal**	
	00	Pulse frequency reduced below 2 Hz			Yes		No	
	01	Reserved			Yes		No	
	02	Phase loss detection enable			No		Yes	
	03	Reserved			Yes		No	
	04	Output current ripple detection enable			No		Yes	
	05	Enhanced dead-time compensation enable			No		Yes	
Note:	See P0290							
P0292	**Converter temperature warning [°C]**	0 - 25	5	U, T	-	-	U16	3
	Defines the temperature difference (in °C) between the overtemperature trip threshold (F4) and the warning threshold (A504) of the converter. The trip threshold is stored internally by the converter and cannot be changed by the user.							
P0294	**Converter I^2t warning [%]**	10.0 - 100.0	95.0	U, T	-	-	Float	3
	Defines the [%] value at which warning A505 (converter I^2t) is generated. Converter I^2t calculation is used to determine a maximum tolerable period for converter overload. The I^2t calculation value is deemed = 100 % when this maximum tolerable period is reached.							
Dependency:	• The output current of the converter has been reduced. • The value of I^2t does not exceed 100 %.							
Note:	P0294 = 100 % corresponds to stationary nominal load.							
P0295	**Converter fan off delay time [s]**	0 - 3600	0	U, T	-	-	U16	3
	Defines converter fan switch-off delay time in seconds after converter has stopped.							
Note:	Setting to 0, converter fan will switch off when the converter stops, that means no delay.							
P0296	**Response to high output current ripple**	0 - 2	0	T	-	-	U16	3
	Defines the converter response with increased ripple in the output current.							
	0	No response						
	1	Alarm produced (A523)						
	2	Fault produced (F23)						
P0301[0...2]	**Easy motor data, rated motor power [kW]**	0 - 2000	0	C(1)	-	DDS	Float	1
	Rated motor power from the rating plate. No other data is necessary. If this parameter is used, the rest of the motor data are then estimated by the firmware.							
Dependency:	Changeable only when P0010 = 1 (quick commissioning).							
Caution:	This functionality is only valid with 50 Hz supply, star configuration on 4-pole motors. You must set this parameter to zero if you desire to set the other motor data.							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P0304[0...2]	**Rated motor voltage [V]**	10 - 2000	400	C(1)	-	DDS	U16	1
	Nominal motor voltage from rating plate.							
Dependency:	Changeable only when P0010 = 1 (quick commissioning). Default value is depending on converter type and its rating data.							
Caution:	The input of rating plate data must correspond with the wiring of the motor (star/delta). This means, if delta wiring is used for the motor, delta rating plate data has to be entered. 							
Note:	Following diagram shows a typical rating plate with the locations of the relevant motor data. 							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P0305[0...2]	**Rated motor current [A]**	0.01 - 10000.00	1.86	C(1)	-	DDS	Float	1
	Nominal motor current from rating plate.							
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 converter current r0209 and the motor type: Asynchronous motor : P0305_max = P0209 It is recommended that the ratio of P0305 (rated motor current) and r0207 (rated converter current) should not be lower than: (1/8) <= (P0305/r0207) When the relation of the nominal motor current P0305 and half of the maximal converter current (r0209) exceeds 1.5 an additional current derating is applied. This is necessary to protect the converter from harmonic current waves.  Default value is depending on converter type and its rating data.							
P0307[0...2]	**Rated motor power**	0.01 - 2000.00	0.75	C(1)	-	DDS	Float	1
	Nominal motor power [kW/hp] from rating plate.							
Dependency:	If P0100 = 1, values will be in [hp]. Changeable only when P0010 = 1 (quick commissioning).							
Note:	Default value is depending on converter type and its rating data.							
P0308[0...2]	**Rated motor cosφ**	0.000 - 1.000	0.000	C(1)	-	DDS	Float	1
	Nominal motor power factor (cosφ) from rating plate.							
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. The value is displayed in r0332.							
P0309[0...2]	**Rated motor efficiency [%]**	0.0 - 99.9	0.0	C(1)	-	DDS	Float	1
	Nominal motor efficiency 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. The value is displayed in r0332.							
P0310[0...2]	**Rated motor frequency [Hz]**	12.00 - 550.00	50.00	C(1)	-	DDS	Float	1
	Nominal motor frequency from rating plate.							
Dependency:	Changeable only when P0010 = 1 (quick commissioning). Pole pair number recalculated automatically if parameter is changed.							
Note:	Changes to P0310 can influence the maximum motor frequency. For further information see P1082.							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P0311[0...2]	**Rated motor speed [RPM]**	0 - 40000	1395	C(1)	-	DDS	U16	1
	Nominal motor speed from rating plate.							
Dependency:	Changeable only when P0010 = 1 (quick commissioning). Setting 0 causes internal calculation of value. Slip compensation in V/f control requires rated motor speed for correct operation. Pole pair number recalculated automatically if parameter is changed.							
Note:	Default value is depending on converter type and its rating data.							
r0313[0...2]	**Motor pole pairs**	-	-	-	-	DDS	U16	3
	Displays number of motor pole pairs that the converter is currently using for internal calculations.							
Dependency:	Recalculated automatically when P0310 (rated motor frequency) or P0311 (rated motor speed) is changed. r0313 = 1: 2-pole motor r0313 = 2: 4-pole motor ...							
P0314[0...2]	**Motor pole pair number**	0 - 99	0	C(1)	-	DDS	U16	3
	Specifies number of pole pairs of motor.							
Dependency:	Changeable only when P0010 = 1 (quick commissioning). Setting 0 causes r0313 (calculated motor pole pairs) to be used during operation. Setting to > 0 overrides r0313. P0314 = 1: 2-pole motor P0314 = 2: 4-pole motor ...							
P0320[0...2]	**Motor magnetizing current [%]**	0.0 - 99.0	0.0	C, T	-	DDS	Float	3
	Defines motor magnetization current relative to P0305 (rated motor current).							
Dependency:	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 r0331.							
r0330[0...2]	**Rated motor slip [%]**	-	-	-	PERCENT	DDS	Float	3
	Displays nominal motor slip relative to P0310 (rated motor frequency) and P0311 (rated motor speed). r0330[%] = ((P0310 - r0313 * (P0311/60))/P0310) * 100%							
r0331[0...2]	**Rated magnetization current [A]**	-	-	-	-	DDS	Float	3
	Displays calculated magnetizing current of motor.							
r0332[0...2]	**Rated power factor**	-	-	-	-	DDS	Float	3
	Displays power factor for motor.							
Dependency:	Value is calculated internally if P0308 (rated motor cosφ) set to 0; otherwise, value entered in P0308 is displayed.							
r0333[0...2]	**Rated motor torque [Nm]**	-	-	-	-	DDS	Float	3
	Displays rated motor torque.							
Dependency:	Value is calculated from P0307 (rated motor power) and P0311 (rated motor speed). r0333[Nm] = (P0307[kW] * 1000)/((P0311[1/min]/60) * 2 * Pi)							
P0335[0...2]	**Motor cooling**	0 - 3	0	C, T	-	DDS	U16	2
	Selects motor cooling system used.							
	0	Self-cooled: Shaft mounted fan attached motor						
	1	Force-cooled: Separately powered cooling fan						
	2	Self-cooled and internal fan						
	3	Force-cooled and internal fan						

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P0340[0...2]	**Calculation of motor parameters**	0 - 4	0	T	-	DDS	U16	2
	Calculates various motor parameters.							
				P0340 = 1	P0340 = 2	P0340 = 3	P0340 = 4	
	P0341[0...2] Motor inertia [kg*m^2]			x				
	P0342[0...2] Total/motor inertia ratio			x				
	P0344[0...2] Motor weight			x				
	P0346[0...2] Magnetization time			x		x		
	P0347[0...2] Demagnetization time			x		x		
	P0350[0...2] Stator resistance (line-to-line)			x	x			
	P0352[0...2] Cable resistance			x	x			
	P0354[0...2] Rotor resistance			x	x			
	P0356[0...2] Stator leakage inductance			x	x			
	P0358[0...2] Rotor leakage inductance			x	x			
	P0360[0...2] Main inductance			x	x			
	P0625[0...2] Surrounding motor temperature			x	x			
	P1253[0...2] Controller output limitation			x		x		
	P1316[0...2] Boost end frequency			x		x		
	P1338[0...2] Resonance damping gain V/f			x		x	x	
	P1341[0...2] Imax controller integral time			x		x	x	
	P1345[0...2] Imax voltage ctrl. prop. gain			x		x	x	
	P1346[0...2] Imax voltage ctrl. integral time			x		x	x	
	P2002[0...2] Reference current			x				
	P2003[0...2] Reference torque			x				
	P2185[0...2] Upper torque threshold 1			x				
	P2187[0...2] Upper torque threshold 2			x				
	P2189[0...2] Upper torque threshold 3			x				
	0	No calculation						
	1	Complete parameterization						
	2	Calculation of equivalent circuit data						
	3	Calculation of V/f control data						
	4	Calculation of controller settings only						
Note:	This parameter is required during commissioning to optimize converter performance. If there is a large mismatch in Power ratings of converter to Motor it is possible that r0384 and r0386 may not be calculated correctly. In these cases use P1900. When transferring P0340, the converter uses its processor to carry out internal calculations. Communications to the converter may be interrupted. The faults can be acknowledged as soon as the calculations have been completed in the converter. These calculations can take approximately 10s to complete.							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P0341[0...2]	**Motor inertia [kg*m^2]**	0.0001 - 1000.0	0.0018	U, T	-	DDS	Float	3
	Sets no-load inertia of motor. Together with P0342 (inertia ratio total/motor) and P1496 (scaling factor acceleration), this value produces the acceleration torque (r1518), which can be added to any additional torque produced from a BICO source (P1511), and incorporated in the torque control function.							
Dependency:	This parameter is influenced by automatic calculations defined by P0340.							
Note:	The result of P0341 * P0342 is included in the speed controller calculation. P0341 * P0342 = total motor inertia P1496 = 100 % activates acceleration pre-control for the speed controller and calculates the torque from P0341 and P0342.							
P0342[0...2]	**Total/motor inertia ratio**	1.000 - 400.00	1.000	U, T	-	DDS	Float	3
	Specifies ratio between total inertia (load + motor) and motor inertia.							
Dependency:	See P0341							
P0344[0...2]	**Motor weight [kg]**	1.0 - 6500.0	9.4	U, T	-	DDS	Float	3
	Specifies motor weight [kg].							
Dependency:	See P0341							
Note:	This value is used in the motor thermal model. It is normally calculated automatically from P0340 (motor parameters) but can also be entered manually. Default value is depending on converter type and its rating data.							
r0345[0...2]	**Motor start-up time [s]**	-	-	-	-	DDS	Float	3
	Displays motor start-up time. This time corresponds to the standardized motor inertia. The start-up time is the time taken to reach rated motor speed from standstill at acceleration with rated motor torque (r0333).							
P0346[0...2]	**Magnetization time [s]**	0.000 - 20.000	1.000	U, T	-	DDS	Float	3
	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.							
Dependency:	See P0341							
Notice:	An excessive reduction of this time can result in insufficient motor magnetization.							
Note:	If boost settings are higher than 100 %, magnetization time may be reduced. Default value is depending on converter type and its rating data.							
P0347[0...2]	**Demagnetization time [s]**	0.000 - 20.000	1.000	U, T	-	DDS	Float	3
	Changes time allowed after OFF2/fault condition, before pulses can be re-enabled.							
Dependency:	See P0341							
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.							
Note:	The demagnetization time is approximately 2.5 x rotor time constant in seconds. Default value is depending on converter type and its rating data.							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P0350[0...2]	**Stator resistance (line) [Ω]**	0.00001 - 2000.0	2.0000	U, T	-	DDS	Float	3
	Stator resistance value for connected motor (line value). The parameter value doesn't include the cable resistance.							
Dependency:	See P0341							
Note:	There are three ways to determine the value for this parameter: • Calculate using – P0340 = 1 (data entered from rating plate) or – P0010 = 1, P3900 = 1, 2 or 3 (end of quick commissioning). • Measure using P1900 = 2 (standard motor data identification - value for stator resistance is overwritten). • Measure manually using an Ohmmeter. Since the manually measured resistor is a line-to-line value, which includes the cable resistors, the measured value has to be divided by two and the cable resistor of a line has to be subtracted from that value. The value entered in P0350 is the one obtained by the method last used. Default value is depending on converter type and its rating data.							
P0352[0...2]	**Cable resistance [Ω]**	0.0 - 120.0	0.0	U, T	-	DDS	Float	3
	Cable resistance value between converter and motor for one phase.							
Dependency:	See P0341							
P0354[0...2]	**Rotor resistance [Ω]**	0.0 - 300.0	10.0	U, T	-	DDS	Float	3
	Sets rotor resistance of motor equivalent circuit (phase value).							
Dependency:	Calculated automatically using the motor model or determined using P1900 (motor identification). This parameter is influenced by automatic calculations defined by P0340.							
P0356[0...2]	**Stator leakage inductance [mH]**	0.00001 - 1000.0	10.000	U, T	-	DDS	Float	3
	Sets stator leakage inductance of motor equivalent circuit (phase value).							
Dependency:	See P0354							
P0358[0...2]	**Rotor leakage inductance [mH]**	0.0 - 1000.0	10.0	U, T	-	DDS	Float	3
	Sets rotor leakage inductance of motor equivalent circuit (phase value).							
Dependency:	See P0354							
P0360[0...2]	**Main inductance [mH]**	0.0 - 10000.0	10.0	U, T	-	DDS	Float	3
	Sets main inductance of the motor equivalent circuit (phase value).							
Dependency:	See P0354							
Caution:	The data of equivalent circuit relates to the star equivalent circuit. Any data of the delta equivalent circuit available therefore must be transformed to the star equivalent circuit before entering into the converter.							
r0370[0...2]	**Stator resistance [%]**	-	-	-	PERCENT	DDS	Float	4
	Displays standardized stator resistance of motor equivalent circuit (phase value).							
r0372[0...2]	**Cable resistance [%]**	-	-	-	PERCENT	DDS	Float	4
	Displays standardized cable resistance of motor equivalent circuit (phase value). It is estimated to be 20 % of the stator resistance.							
r0373[0...2]	**Rated stator resistance [%]**	-	-	-	PERCENT	DDS	Float	4
	Displays rated stator resistance of the motor equivalent circuit (phase value).							
r0374[0...2]	**Rotor resistance [%]**	-	-	-	PERCENT	DDS	Float	4
	Displays standardized rotor resistance of the motor equivalent circuit (phase value).							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
r0376[0...2]	**Rated rotor resistance [%]**	-	-	-	PERCENT	DDS	Float	4
	Displays rated rotor resistance of the motor equivalent circuit (phase value).							
r0377[0...2]	**Total leakage reactance [%]**	-	-	-	PERCENT	DDS	Float	4
	Displays standardized total leakage reactance of the motor equivalent circuit (phase value).							
r0382[0...2]	**Main reactance [%]**	-	-	-	PERCENT	DDS	Float	4
	Displays standardized main reactance of the motor equivalent circuit (phase value).							
r0384[0...2]	**Rotor time constant [ms]**	-	-	-	-	DDS	Float	3
	Displays calculated rotor time constant.							
r0386[0...2]	**Total leakage time constant [ms]**	-	-	-	-	DDS	Float	4
	Displays total leakage time constant of motor.							
r0395	**CO: Total stator resistance [%]**	-	-	-	PERCENT	-	Float	3
	Displays stator resistance of motor of combined stator/cable resistance.							
P0503[0...2]	**Enable Keep-running Operation**	0 - 1	0	T	-	-	U16	3
	Enables keep-running operation. This attempts to prevent the converter from tripping by enabling all possible existing de-rating features, and the automatic restart function. May be used with P2113 = 1 (converter warnings disabled) to mask resulting warnings from the user.							
	0	Keep-running mode disabled						
	1	Keep-running mode enabled						
Index:	[0]	Drive data set 0 (DDS0)						
	[1]	Drive data set 1 (DDS1)						
	[2]	Drive data set 2 (DDS2)						
Notice:	P0503 = 1 Sets the following parameter values to minimize likelihood of a trip: • P0290 = 2 (converter overload reaction: reduce pulse frequency, output current and output frequency) • P1210 = 7 (automatic restart function: restart after mains brown- /blackout or fault, trip when P1211 expires) • P1211 = 10 (number of times converter will attempt to restart) • P1240 = 3 (configuration of Vdc controller: Vdc_max controller and kinetic buffering (KIB) enabled) P0503 = 0 Resets the parameters to their default values: • P0290 = 2 (converter overload reaction: reduce pulse frequency, output current and output frequency) • P1210 = 1 (automatic restart function: trip reset after power on, P1211 disabled) • P1211 = 3 (number of times converter will attempt to restart) • P1240 = 1(configuration of Vdc controller: Vdc_max controller enabled)							
Note:	See also P0290, P1210, P1211, P1240, and P2113							
P0507	**Application macro**	0 - 255	0	C(1)	-	-	U16	1
	Selects a given Application macro, which is a set of parameter values for a given application. There are a number of application macros covering a set of basic applications such as simple pump, conveyor, compressor etc.							
Note:	Please note that to guarantee correct setting of the Application macro, the Application macro number should only be changed during Setup directly after a parameter reset.							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P0511[0...2]	**Scaling for display**	0.00 - 100.00	[0] 1.00 [1] 1.00 [2] 0.00	U, T	-	-	Float	3
	Allows operator to enter the scaling factors for the display of motor frequency. Index 0 = value of multiplier (a) Index 1 = value of divisor (b) Index 2 = value of constant (c) With the parameter set to a non-default value the displayed value for frequency and setpoint on internal and external BOPs is scaled accordingly. Note - the units "Hz" is no longer displayed if the value is scaled. The formula used to scale the display is: (a/b)*N + c.							
Index:	[0]	Multiplier for Scaling for display						
	[1]	Divider for Scaling for display						
	[2]	Constant for Scaling for display						
r0512	**CO: Scaled filtered frequency**	-	-	-	-	-	Float	2
	Displays actual converter output frequency (r0024) excluding slip compensation (and resonance damping, frequency limitation in V/f mode).							
P0604[0...2]	**Threshold motor temperature [°C]**	0.0 - 200.0	130.0	U, T	-	DDS	Float	2
	Enters warning threshold for motor temperature protection. The trip temperature defined is always 10 % higher than the warning threshold P0604. When actual motor temperature exceeds warning temperature then converter reacts as defined in P0610.							
Dependency:	This value should be at least 40°C higher than the motor surrounding temperature P0625.							
P0610[0...2]	**Motor I^2t temperature reaction**	0 - 6	6	T	-	DDS	U16	3
	Defines reaction when motor temperature reaches warning threshold.							
	0	Warning only. Does not recall the motor temperature (stored at power down) on power up						
	1	Warning with Imax control (motor current reduced) and trip (F11). Does not recall the motor temperature (stored at power down) on power up						
	2	Warning and trip (F11). Does not recall the motor temperature (stored at power down) on power up						
	4	Warning only. Recalls the motor temperature (stored at power down) on power up						
	5	Warning with Imax control (motor current reduced) and trip (F11). Recalls the motor temperature (stored at power down) on power up						
	6	Warning and trip (F11). Recalls the motor temperature (stored at power down) on power up						
Dependency:	Trip level = P0604 (motor temperature threshold) * 110 %							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
Note:	• P0610 = 0 (No reaction, warning only) When temperature reaches warning level defined in P0604, the converter displays warning A511, no reaction is done. • P0610 = 1 (Warning, Imax reduction and Trip) When temperature reaches warning level defined in P0604, the converter displays warning A511, reduce frequency and trips F11, when temperature exceeds the trip level. • P0610 = 2 (Warning and trip F11) When temperature reaches warning level defined in P0604, the converter displays warning A511 and trips F11, when temperature exceeds the trip level. The purpose of motor I^2t is to calculate the motor temperature and disable the converter if the motor is in danger of overheating. I^2t operation: The measured motor current is displayed in r0027. The motor temperature in °C is displayed in r0035. This temperature is derived from a calculated value using motor thermal model. The reaction to the warning can be changed from this default using P0610. r0035 is particularly useful to monitor if the calculated motor temperature is rising excessively.							
P0622[0...2]	**Magnetizing time for temp id after start up [ms]**	0.000 - 20000	0.000	U, T	-	DDS	Float	3
	Specifies the magnetization time for stator resistance identification.							
r0623[0...2]	**CO: Display for the identified stator resistance [Ω]**	-	-	-	-	DDS	Float	4
	Display of the actual identified stator resistance after temperature identification.							
P0625[0...2]	**Surrounding motor temperature [°C]**	-40.0 - 80.0	20.0	C, U, T	-	DDS	Float	3
	Surrounding temperature of motor at time of motor data identification. It is only allowed to change the value when the motor is cold. A motor identification has to be made after changing the value.							
Dependency:	This parameter is influenced by automatic calculations defined by P0340.							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P0626[0...2]	**Overtemperature stator iron [°C]**	20.0 - 200.0	50.0	U, T	-	DDS	Float	4
	Overtemperature of stator iron.							
Note:	Temperature rises are valid for sinusoidal operations (line supply temperature rises). Temperature rises due to converter operation (modulation losses) and output filter are also considered.							
P0627[0...2]	**Overtemperature stator winding [°C]**	20.0 - 200.0	80.0	U, T	-	DDS	Float	4
	Overtemperature of the stator winding. It is only allowed to change the value when the motor is cold. A motor identification has to be made after changing the value.							
Note:	See P0626							
P0628[0...2]	**Overtemperature rotor winding [°C]**	20.0 - 200.0	100.0	U, T	-	DDS	Float	4
	Overtemperature of the rotor winding.							
Note:	See P0626							
r0630[0...2]	**CO: Motor model surrounding temp. [°C]**	-	-	-	-	DDS	Float	4
	Displays the surrounding temperature of the motor mass model.							
r0631[0...2]	**CO: Stator iron temperature [°C]**	-	-	-	-	DDS	Float	4
	Displays the iron temperature of the motor mass model.							
r0632[0...2]	**CO: Stator winding temperature [°C]**	-	-	-	-	DDS	Float	4
	Displays the stator winding temperature of the motor mass model.							
r0633[0...2]	**CO: Rotor winding temperature [°C]**	-	-	-	-	DDS	Float	4
	Displays the rotor winding temperature of the motor mass model.							
P0640[0...2]	**Motor overload factor [%]**	10.0 - 400.0	150.0	C, U, T	-	DDS	Float	2
	Defines motor overload current limit relative to P0305 (rated motor current).							
Dependency:	Limited to maximum converter current or to 400 % of rated motor current (P0305), whichever is the lower. P0640_max = (min(r0209, 4 * P0305)/P0305) * 100							
Note:	Changes to P0640 will be effective only after the next off state.							
P0700[0...2]	**Selection of command source**	0 - 5	1	C, T	-	CDS	U16	1
	Selects digital command source.							
	0	Factory default setting						
	1	Operator panel (keypad)						
	2	Terminal						
	5	USS/MODBUS on RS485						
Dependency:	Changing this parameter sets (to default) all settings on item selected. These are the following parameters: P0701, ... (function of digital input), P0840, P0842, P0844, P0845, P0848, P0849, P0852, P1020, P1021, P1022, P1023, P1035, P1036, P1055, P1056, P1074, P1110, P1113, P1124, P1140, P1141, P1142, P1230, P2103, P2104, P2106, P2200, P2220, P2221, P2222, P2223, P2235, P2236							
Caution:	Be aware, by changing of P0700 all BI parameters are reset to the default value.							
Note:	RS485 also supports MODBUS protocol as well as USS. All USS options on RS485 are also applicable to MODBUS. If P0700 = 0, the values of the following parameters relevant to the digital input function will be restricted to their defaults: P0701, P0702, P0703, P0704, P0712 and P0713.							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P0701[0...2]	**Function of digital input 1**	0 - 99	0	T	-	CDS	U16	2
	Selects function of digital input 1.							
	0	Digital input disabled						
	1	ON/OFF1						
	2	ON reverse/OFF1						
	3	OFF2 - coast to standstill						
	4	OFF3 - quick ramp-down						
	5	ON/OFF2						
	9	Fault acknowledge						
	10	JOG right						
	11	JOG left						
	12	Reverse						
	13	MOP up (increase frequency)						
	14	MOP down (decrease frequency)						
	15	Fixed frequency selector bit0						
	16	Fixed frequency selector bit1						
	17	Fixed frequency selector bit2						
	18	Fixed frequency selector bit3						
	22	QuickStop Source 1						
	23	QuickStop Source 2						
	24	QuickStop Override						
	25	DC brake enable						
	27	Enable PID						
	29	External trip						
	33	Disable additional freq setpoint						
	99	Enable BICO parameterization						
Dependency:	Resetting 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							
Note:	"ON/OFF1" can only be selected for one digital input (e.g. P0700 = 2 and P0701 = 1). Configuring DI2 with P0702 = 1 will disable digital input 1 by setting P0701 = 0. Only the last activated digital input serves as a command source. "ON/OFF1" on a digital input can be combined with "ON reverse/OFF1" on another digital input. For information about the quick stop function, see the FAQ (https://support.industry.siemens.com/cs/ww/en/view/109783712) provided on the Internet.							
P0702[0...2]	**Function of digital input 2**	0 - 99	0	T	-	CDS	U16	2
	Selects function of digital input 2. See P0701.							
P0703[0...2]	**Function of digital input 3**	0 - 99	9	T	-	CDS	U16	2
	Selects function of digital input 3. See P0701.							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P0704[0...2]	**Function of digital input 4**	0 - 99	15	T	-	CDS	U16	2
	Selects function of digital input 4. See P0701.							
P0705[0...2]	**Function of digital input 5**	0 - 99	16	T	-	CDS	U16	2
	Selects function of digital input 5. See P0701.							
Note:	This digital input is provided by the optional I/O Extension Module.							
P0706[0...2]	**Function of digital input 6**	0 - 99	17	T	-	CDS	U16	2
	Selects function of digital input 6. See P0701.							
Note:	This digital input is provided by the optional I/O Extension Module.							
P0712[0...2]	**Analog/digital input 1**	0 - 99	0	T	-	CDS	U16	2
	Selects function of digital input AI1 (via analog input). See P0701.							
Note:	See P0701. Signals above 4 V are active; signals below 1.6 V are inactive.							
P0713[0...2]	**Analog/digital input 2**	0 - 99	0	T	-	CDS	U16	2
	Selects function of digital input AI2 (via analog input). See P0701.							
Note:	See P0701. Signals above 4 V are active; signals below 1.6 V are inactive.							
P0717	**Connection macro**	0 - 255	0	C(1)	-	-	U16	1
	Selects a given connection macro, which is a set of parameter values for a given set of control connections. There are a number of connection macros which define basic control connection settings such as Terminals, BOP, PID with analog setpoint etc.							
Note:	Please note that to guarantee correct setting of the Connection macro, the Connection macro number should only be changed during Setup directly after a parameter reset.							
P0719[0...2]	**Selection of command & frequency setpoint**	0 - 57	0	T	-	CDS	U16	4
	Central switch to select control command source for converter. 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.							
	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 RS232 (reserved)						
	5	Cmd = BICO parameter, Setpoint = USS/MODBUS on RS485						
	7	Cmd = BICO parameter, Setpoint = Analog setpoint 2						
	40	Cmd = USS on RS232 (reserved), Setpoint = BICO parameter						
	41	Cmd = USS on RS232 (reserved), Setpoint = MOP setpoint						
	42	Cmd = USS on RS232 (reserved), Setpoint = Analog setpoint						
	43	Cmd = USS on RS232 (reserved), Setpoint = Fixed frequency						
	44	Cmd = USS on RS232 (reserved), Setpoint = USS on RS232 (reserved)						
	45	Cmd = USS on RS232 (reserved), Setpoint = USS/MODBUS on RS485						

Parameter	Function		Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
	47		Cmd = USS on RS232 (reserved), Setpoint = Analog setpoint 2						
	50		Cmd = USS/MODBUS on RS485, Setpoint = BICO parameter						
	51		Cmd = USS/MODBUS on RS485, Setpoint = MOP setpoint						
	52		Cmd = USS/MODBUS on RS485, Setpoint = Analog setpoint						
	53		Cmd = USS/MODBUS on RS485, Setpoint = Fixed frequency						
	54		Cmd = USS/MODBUS on RS485, Setpoint = USS on RS232 (reserved)						
	55		Cmd = USS/MODBUS on RS485, Setpoint = USS/MODBUS on RS485						
	57		Cmd = USS/MODBUS on RS485, Setpoint = Analog setpoint 2						
Dependency:	P0719 has higher priority than P0700 and P1000. If set to a value other than 0 (i.e. BICO parameter is not the setpoint source), P0844/P0848 (first source of OFF2/OFF3) are not effective; instead, P0845/P0849 (second source of OFF2/OFF3) apply and the OFF commands are obtained via the particular source defined. BICO connections made previously remain unchanged.								
Notice:	Particularly useful when e.g. changing command source temporarily from P0700 = 2. Settings in P0719 (contrary to P0700 settings) do not reset the digital inputs (P0701, P0702, ...)								
r0720	**Number of digital inputs**		-	-	-	-	-	U16	3
	Displays number of digital inputs.								
r0722.0...12	**CO/BO: Digital input values**		-	-	-	-	-	U16	2
	Displays status of digital inputs.								
	Bit	**Signal name**				**1 signal**		**0 signal**	
	00	Digital input 1				Yes		No	
	01	Digital input 2				Yes		No	
	02	Digital input 3				Yes		No	
	03	Digital input 4				Yes		No	
	04	Digital input 5				Yes		No	
	05	Digital input 6				Yes		No	
	11	Analog input 1				Yes		No	
	12	Analog input 2				Yes		No	
Note:	Segment is lit when signal is active. The digital input 5 and 6 are provided by the optional I/O Extension Module.								
P0724	**Debounce time for digital inputs**		0 - 3	3	T	-	-	U16	3
	Defines debounce time (filtering time) used for digital inputs.								
	0		No debounce time						
	1		2.5 ms debounce time						
	2		8.2 ms debounce time						
	3		12.3 ms debounce time						

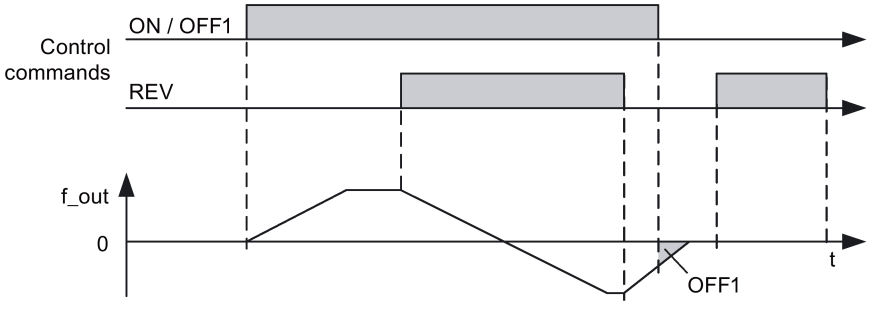
Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P0727[0...2]	**Selection of 2/3-wire method**	0 - 3	0	C, T	-	CDS	U16	2

Determines the control method using the terminals. This parameter allows the selection of the control philosophy. The control philosophies exclude each other.

2/3-wire control allows to start, stop and reverse the converter in one of the following ways:

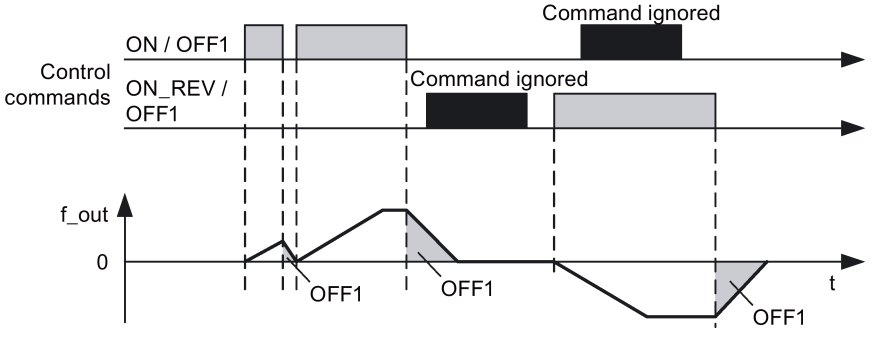
- 2-wire control with Siemens standard control

  using ON/OFF1 and REV as permanent signals



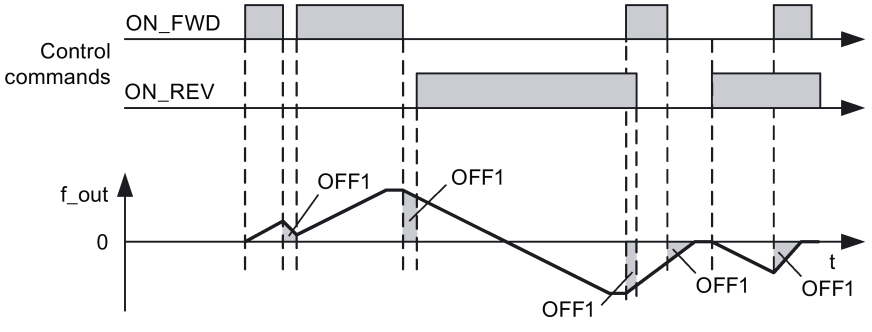
- 2-wire control with Siemens standard control

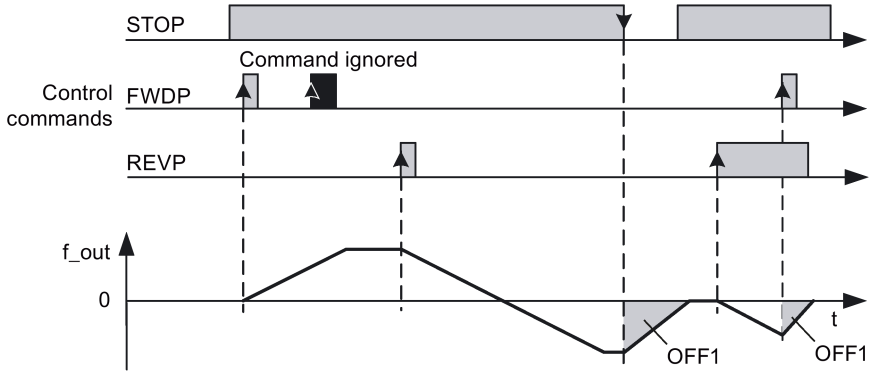
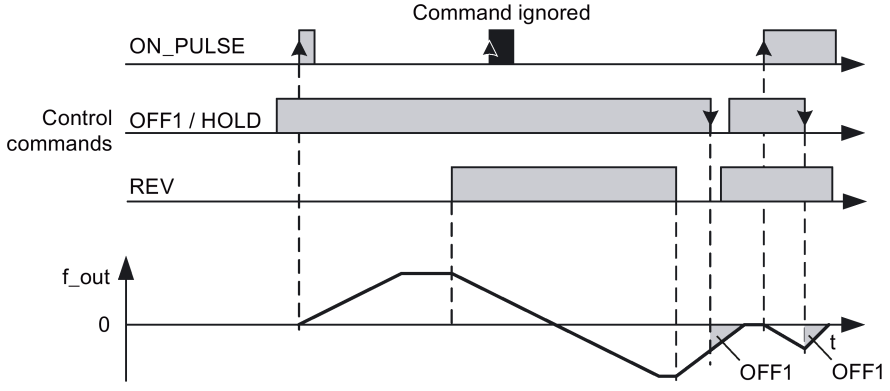
  using ON/OFF1 and ON_REV/OFF1 as permanent signals



- 2-wire control

  using ON_FWD and ON_REV as permanent signals

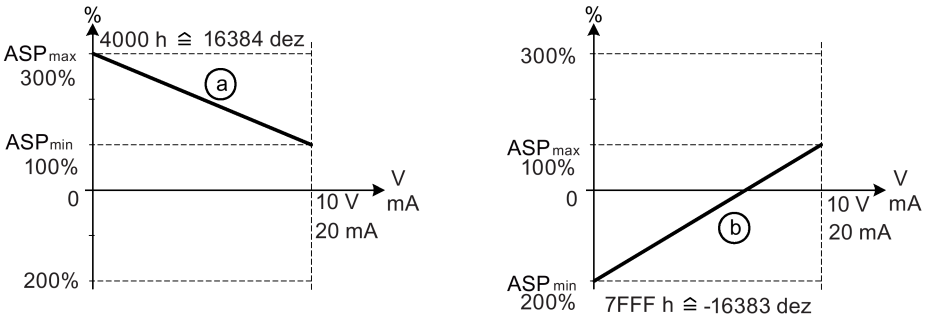


Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
	• 3-wire control using STOP as permanent signal, FWD and REVP as pulses 							
	• 3 wire control using OFF1/HOLD and REV as permanent signal, ON as pulse signal 							
	0	Siemens (start/dir)						
	1	2-wire (fwd/rev)						
	2	3-wire (fwd/rev)						
	3	3-wire (start/dir)						
Note:	Where: • P denotes Pulse • FWD denotes FORWARD • REV denotes REVERSE When any of the control functions are selected using P0727, the setting for the digital inputs (P0701 - P0704) are redefined as follows:							

	Settings of P0701 - P0706	P0727 = 0 (Siemens Standard Control)	P0727 = 1 (2-wire Control)	P0727 = 2 (3-wire Control)	P0727 = 3 (3-wire Control)
	= 1 (P0840)	ON/OFF1	ON_FWD	STOP	ON_PULSE
	= 2 (P0842)	ON_REV/OFF1	ON_REV	FWDP	OFF1/HOLD
	= 12 (P1113)	REV	REV	REVP	REV
	To use the 2/3-wire control, the sources for ON/OFF1 (P0840), ON_REV/OFF1 (P0842) and REV (P1113) corresponding to the redefined values have to be set accordingly. The ON/OFF2 functionality is not supported in 2/3 wire modes. Do not select ON/OFF2 unless P0727 = 0.				
	Regarding the use of fixed frequencies see P1000 and P1001.				

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
r0730	**Number of digital outputs**	-	-	-	-	-	U16	3
	Displays number of digital outputs.							
P0731[0...2]	**BI: Function of digital output 1**	0 - 4294967295	52.3	U, T	-	CDS	U32/Bin	2
	Defines source of digital output 1.							
Notice:	An inverse logic can be realized by inverting the digital outputs in P0748.							
Note:	Output of fault bit 52.3 is inverted on digital output. Therefore, with P0748 = 0, the digital output is set to low when a fault is triggered, and when there is no fault, it is set to high. Monitor functions ==> see r0052, r0053 Motor holding brake ==> see P1215 DC-Brake ==> see P1232, P1233							
P0732[0...2]	**BI: Function of digital output 2**	0 - 4294967295	52.7	U, T	-	CDS	U32/Bin	2
	Defines source of digital output 2.							
P0733[0...2]	**BI: Function of digital output 3**	0 - 4294967295	0	U, T	-	CDS	U32/Bin	2
	Defines source of digital output 3.							
Note:	This digital output is provided by the optional I/O Extension Module.							
P0734[0...2]	**BI: Function of digital output 4**	0 - 4294967295	0	U, T	-	CDS	U32/Bin	2
	Defines source of digital output 4.							
Note:	This digital output is provided by the optional I/O Extension Module.							
r0747.0...1	**CO/BO: State of digital outputs**	-	-	-	-	-	U16	3
	Displays status of digital outputs (also includes inversion of digital outputs via P0748).							
	Bit	**Signal name**			**1 signal**		**0 signal**	
	00	Digital output 1 energized			Yes		No	
	01	Digital output 2 energized			Yes		No	
	02	Digital output 3 energized			Yes		No	
	03	Digital output 4 energized			Yes		No	
Dependency:	Bit = 0 signal: Contacts open Bit = 1 signal: Contacts closed							
Note:	The digital output 3 and 4 are provided by the optional I/O Extension Module.							
P0748	**Invert digital outputs**	-	0000 bin	U, T	-	-	U16	3
	Defines high and low states of digital output for a given function.							
	Bit	**Signal name**			**1 signal**		**0 signal**	
	00	Invert digital output 1			Yes		No	
	01	Invert digital output 2			Yes		No	
	02	Invert digital output 3			Yes		No	
	03	Invert digital output 4			Yes		No	
Note:	The digital output 3 and 4 are provided by the optional I/O Extension Module.							
r0750	**Number of analog inputs**	-	-	-	-	-	U16	3
	Displays number of analog inputs available.							

Parameter	Function		Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
r0751.0...9	**CO/BO: Status word of analog input**		-	-	-	-	-	U16	3
	Displays status of analog input.								
	Bit	**Signal name**				**1 signal**		**0 signal**	
	00	Signal lost on analog input 1				Yes		No	
	01	Signal lost on analog input 2				Yes		No	
	08	No signal lost on analog input 1				Yes		No	
	09	No signal lost on analog input 2				Yes		No	
r0752[0...1]	**Actual analog input [V] or [mA]**		-	-	-	-	-	Float	2
	Displays smoothed analog input value in volts or milliamps before the scaling block.								
Index:	[0]		Analog input 1 (AI1)						
	[1]		Analog input 2 (AI2)						
P0753[0...1]	**Smooth time analog input [ms]**		0 - 10000	3	U, T	-	-	U16	3
	Defines filter time (PT1 filter) for analog input.								
Index:	See r0752								
Note:	Increasing this time (smooth) reduces jitter but slows down response to the analog input. P0753 = 0: No filtering								
r0754[0...1]	**Actual analog input value after scaling [%]**		-	-	-	-	-	Float	2
	Shows smoothed value of analog input after scaling block.								
Index:	See r0752								
Dependency:	P0757 to P0760 define range (analog input scaling).								
r0755[0...1]	**CO: Actual analog input after scaling [4000h]**		-	-	-	4000H	-	I16	2
	Displays analog input, scaled using ASPmin and ASPmax (ASP = analog setpoint). Analog setpoint (ASP) from the analog scaling block can vary from minimum analog setpoint (ASPmin) to a maximum analog setpoint (ASPmax). The largest magnitude (value without sign) of ASPmin and ASPmax defines the scaling of 16384. By associating r0755 with an internal value (e.g. frequency setpoint), a scaled value is calculated internally by the converter. The frequency value is calculated using the following equation: r0755 [Hz] = (r0755 [hex]/4000 [hex]) * P2000 * (max (|ASP_max|, |ASP_min|)/100%)								

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
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 ($\|ASP_{max}\|$, $\|ASP_{min}\|$) 							
Index:	See r0752							
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). See P0757 to P0760 (analog input scaling).							
P0756[0...1]	**Type of analog input**	0 - 4	0	T	-	-	U16	2
	Defines type of analog input and also enables analog input monitoring.							
	0	Unipolar voltage input (0 to 10 V)						
	1	Unipolar voltage input with monitoring (0 to 10 V)						
	2	Unipolar current input (0 to 20 mA)						
	3	Unipolar current input with monitoring (0 to 20 mA)						
	4	Bipolar voltage input (-10 V to 10 V)						
Index:	See r0752							
Dependency:	The monitoring function is disabled if the analog scaling block is programmed to output negative setpoints (see P0757 to P0760).							
Notice:	When monitoring is enabled and a deadband defined (P0761), a fault condition will be generated (F80) if the analog input voltage falls below 50 % of the deadband voltage. It is not possible to select the bipolar voltage for analog input 2. For P0756 = 4, you need to ensure the analog input scaling, for example, if you desire to obtain an output frequency within the range of -50 Hz to 50 Hz, you can set parameters P0757 to P0760 within their negative ranges (examples: P0757 = -10 V, P0758 = -100%).							
Note:	See P0757 to P0760 (analog input scaling). In current mode, if the input exceeds 24mA, the converter will trip F80/11 for analog input 1 and F80/12 for analog input 2. This will result in channel switching back to voltage mode. Analog input parameter readings for the channel concerned will no longer be updated until the fault (F80) has been reset. Once the fault has been reset then the input will switch back to current mode and normal readings will resume.							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P0757[0...1]	**Value x1 of analog input scaling**	-20 - 20	0	U, T	-	-	Float	2
	P0757 - P0760 configure the input scaling. x1 is the first value of the two pairs of variants x1/y1 and x2/y2 which determine the straight line. The value x2 of analog input scaling P0759 must be greater than the value x1 of analog input scaling P0757.							
Index:	See r0752							
Notice:	• 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 or 20 mA). • ASPmin represents lowest analog setpoint (this may be at 0 V or 20 mA). • Default values provide a scaling of 0 V or 0 mA = 0 %, and 10 V or 20 mA = 100 %.							
P0758[0...1]	**Value y1 of analog input scaling [%]**	-99999.9 - 99999.9	0.0	U, T	-	-	Float	2
	Sets value of y1 as described in P0757 (analog input scaling)							
Index:	See r0752							
Dependency:	Affects P2000 to P2003 (reference frequency, voltage, current or torque) depending on which setpoint is to be generated.							
P0759[0...1]	**Value x2 of analog input scaling**	-20 - 20	10	U, T	-	-	Float	2
	Sets value of x2 as described in P0757 (analog input scaling).							
Index:	See r0752							
Notice:	The value x2 of analog input scaling P0759 must be greater than the value x1 of analog input scaling P0757.							
P0760[0...1]	**Value y2 of analog input scaling [%]**	-99999.9 - 99999.9	100.0	U, T	-	-	Float	2
	Sets value of y2 as described in P0757 (analog input scaling).							
Index:	See r0752							
Dependency:	See P0758							
P0761[0...1]	**Width of analog input deadband**	0 - 20	0	U, T	-	-	Float	2
	Defines width of deadband on analog input.							
Example:	The following example produces a 2 V to 10 V, 0 Hz to 50 Hz analog input (analog input value 2 V to 10 V, 0 Hz to 50 Hz): • P2000 = 50 Hz • P0759 = 8 V P0760 = 75 % • P0757 = 2 V P0758 = 0 % • P0761 = 2 V • P0756 = 0 or 1 The following example produces a 0 V to 10 V analog input (-50 Hz to +50 Hz) with center zero and a "holding point" 0.2 V wide (0.1 V to each side of center, analog input value 0 V to 10 V, -50 Hz to +50 Hz): • P2000 = 50 Hz • P0759 = 8.75 V P0760 = 75 % • P0757 = 1.25 V P0758 = -75 % • P0761 = 0.1 V • P0756 = 0 or 1							

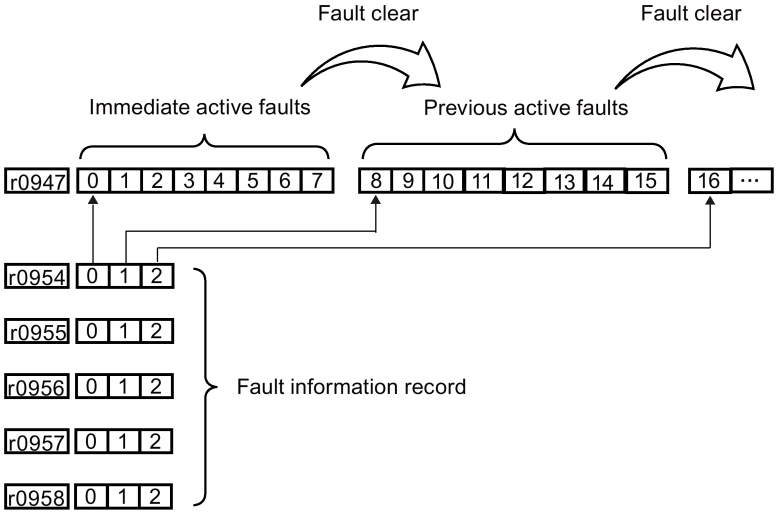
Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
Index:	See r0752							
Notice:	Deadband starts from 0 V to value of P0761, if both values of P0758 and P0760 (y coordinates of analog input scaling) are positive or negative respectively. However, deadband is active in both directions from point of intersection (x axis with analog input scaling curve), if sign of P0758 and P0760 are opposite.							
Note:	P0761[x] = 0: No deadband active. Minimum frequency P1080 should be zero when using center zero setup. There is no hysteresis at the end of the deadband.							
P0762[0...1]	**Delay for loss of signal action [ms]**	0 - 10000	10	U, T	-	-	U16	3
	Defines time delay between loss of analog setpoint and appearance of fault code F80.							
Index:	See r0752							
Note:	Expert users can choose the desired reaction to F80 (default is OFF2).							
r0770	**Number of analog output**	-	-	-	-	-	U16	3
	Displays number of analog outputs available.							
P0771[0]	**CI: Analog output**	0 - 4294967295	21[0]	U, T	-	-	U32	2
	Defines function of the analog output.							
Index:	[0]	Analog output 1 (AO1)						
Setting:	21	CO: Actual frequency (scaled to P2000)						
	24	CO: Actual output frequency (scaled to P2000)						
	25	CO: Actual output voltage (scaled to P2001)						
	26	CO: Actual DC-link voltage (scaled to P2001)						
	27	CO: Actual output current (scaled to P2002)						
P0773[0]	**Smooth time analog output [ms]**	0 - 1000	2	U, T	-	-	U16	2
	Defines smoothing time for analog output signal. This parameter enables smoothing for analog output using a PT1 filter.							
Index:	See P0771							
Dependency:	P0773 = 0: Deactivates filter.							
r0774[0]	**Actual analog output value [V] or [mA]**	-	-	-	-	-	Float	2
	Shows value of analog output after filtering and scaling.							
Index:	See P0771							
Note:	The analog output is only a current output. By connecting an external resistor of 500 Ω to the terminals (4/5) a voltage output with a range of 0 V to 10 V can be created.							
P0775[0]	**Permit absolute value of analog output**	0 - 1	0	T	-	-	U16	2
	Decides if the absolute value of the analog output is used. If enabled, this parameter will take the absolute value to be outputted. If the value was originally negative then the corresponding bit in r0785 is set, otherwise it is cleared.							
Index:	See P0771							
P0777[0]	**Value x1 of analog output scaling [%]**	-99999 - 99999	0.0	U, T	-	-	Float	2
	Defines x1 output characteristic. Scaling block is responsible for adjustment of output value defined in P0771 (analog output connector input). x1 is the first value of the two pairs of variants x1/y1 and x2/y2 which determine the straight line. The two points P1 (x1, y1) and P2 (x2, y2) can be chosen freely.							
Note:	See P0771							
Dependency:	See P0758							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P0778[0]	**Value y1 of analog output scaling**	0 - 20	0	U, T	-	-	Float	2
	Defines y1 of output characteristic.							
Index:	See P0771							
P0779[0]	**Value x2 of analog output scaling [%]**	-99999 - 99999	100.0	U, T	-	-	Float	2
	Defines x2 of output characteristic.							
Index:	See P0771							
Dependency:	See P0758							
P0780[0]	**Value y2 of analog output scaling**	0 - 20	20	U, T	-	-	Float	2
	Defines y2 of output characteristic.							
Index:	See P0771							
P0781[0]	**Width of analog output deadband**	0 - 20	0	U, T	-	-	Float	2
	Sets width of dead-band for analog output.							
Index:	See P0771							
r0785.0	**CO/BO: Status word of analog output**	-	-	-	-	-	U16	2
	Displays status of analog output. Bit 0 indicates that the value of analog output 1 is negative.							
	Bit	**Signal name**			**1 signal**		**0 signal**	
	00	Analog output 1 negative			Yes		No	
P0802	**Transfer data from EEPROM**	0 - 2	0	C(30)	-	-	U16	3
	Transfers values from the converter to external device when P0802 ≠ 0. P0010 must be set to 30 for this to be possible.							
	0	Disabled						
	2	Start data transfer to the SD card						
Note:	Parameter is automatically reset to 0 (default) after transfer. P0010 will be reset to 0 on successful completion. Ensure that enough space exists on the SD card before transferring data (8 KB).							
P0803	**Transfer data to EEPROM**	0 - 3	0	C(30)	-	-	U16	3
	0	Disabled						
	2	Start data transfer from the SD card						
	3	Start data transfer from the SD card (except the motor data)						
	Transfers parameter values from the SD clone file to the converter when P0803 ≠ 0. P0010 must be set to 30 to activate this parameter. See P0802 for parameter values.							
Note:	Parameter is automatically reset to 0 (default) after transfer. P0010 will be reset to 0 on successful completion.							
P0804	**Select Clone file**	0 - 99	0	C(30)	-	-	U16	3
	Select clone file to upload/download. if P0804 = 0, then the file name is clone00.bin if P0804 = 1, then the file name is clone01.bin etc.							
P0806	**BI: Inhibit panel access**	0 - 4294967295	0	U, T	-	-	U32	3
	Binector input to lock control panel access through external client.							

Parameter	Function		Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
r0807.0	**BO: Displays client access**		-	-	-	-	-	U16	3
	Binector output to display whether command and setpoint source is connected to an external client.								
	Bit	**Signal name**				**1 signal**		**0 signal**	
	00	Master control active				Yes		No	
P0809[0...2]	**Copy command data set (CDS)**		0 - 2	[0] 0 [1] 1 [2] 0	T	-	-	U16	2
	Calls 'Copy command data set (CDS)' function. The list of all command data sets (CDS) parameters is shown in "Index" at the end of the manual.								
Example:	Copying of all values from CDS0 to CDS2 can be accomplished by the following procedure: P0809[0] = 0 Copy from CDS0 P0809[1] = 2 Copy to CDS2 P0809[2] = 1 Start copy								
Index:	[0]		Copy from CDS						
	[1]		Copy to CDS						
	[2]		Start copy						
Note:	Start value in index 2 is automatically reset to '0' after execution of function.								
P0810	**BI: command data set bit 0 (Hand/Auto)**		0 - 4294967295	0	U, T	-	-	U32	2
	Selects command source from which to read Bit 0 for selecting a command data set (CDS). The actual selected CDS is displayed in r0054.15 (CDS bit 0) and r0055.15 (CDS bit 1). The actual active CDS is displayed in r0050.								
Setting:	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:	P0811 is also relevant for command data set (CDS) selection.								
P0811	**BI: command data set bit 1**		0 - 4294967295	0	U, T	-	-	U32	2
	Selects command source from which to read Bit 1 for selecting a command data set (see P0810).								
Setting:	See P0810.								
Note:	P0810 is also relevant for command data set (CDS) selection.								
P0819[0...2]	**Copy drive data set (DDS)**		0 - 2	[0] 0 [1] 1 [2] 0	T	-	-	U16	2
	Calls 'Copy drive data set (DDS)' function. The list of all drive data set (DDS) parameters is shown in "Index" at the end of the manual.								
Example:	Copying of all values from DDS0 to DDS2 can be accomplished by the following procedure: P0819[0] = 0 Copy from DDS0 P0819[1] = 2 Copy to DDS2 P0819[2] = 1 Start copy								
Index:	[0]		Copy from DDS						
	[1]		Copy to DDS						
	[2]		Start copy						
Note:	See P0809								

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P0820	**BI: drive data set bit 0**	0 - 4294967295	0	T	-	-	U32	3
	Selects command source from which to read Bit 0 for selecting a drive data set (DDS). The actual selected drive data set (DDS) is displayed in parameter r0051[0]. The actual active drive data set (DDS) is displayed in parameter r0051[1].							
Setting:	See P0810							
Note:	P0821 is also relevant for drive data set (DDS) selection.							
P0821	**BI: drive data set bit 1**	0 - 4294967295	0	T	-	-	U32	3
	Selects command source from which Bit 1 for selecting a drive data set is to be read in (see P0820).							
Setting:	See P0810							
Note:	P0820 is also relevant for drive data set (DDS) selection.							
P0840[0...2]	**BI: ON/OFF1**	0 - 4294967295	19.0	T	-	CDS	U32	3
	Allows ON/OFF1 command source to be selected using BICO. The digits in front of the colon show the parameter number of the command source; the digits following the colon denote the bit setting for that parameter.							
Setting:	See P0810							
Dependency:	For digital inputs as command source BICO requires P0700 set to 2 (enable BICO). The default setting (ON right) is digital input 1 (722.0). Alternative source possible only when function of digital input 1 is changed (via P0701) before changing value of P0840.							
P0842[0...2]	**BI: ON reverse/OFF1**	0 - 4294967295	0	T	-	CDS	U32	3
	Allows ON/OFF1 reverse command source to be selected using BICO. In general a positive frequency setpoint is run up counterclockwise (negative frequency).							
Setting:	See P0810							
P0843[0...2]	BI: ON/OFF2	0 - 4294967295	1	T	-	CDS	U32/Bin	3
	Allows ON/OFF2 command source to be selected using BICO. The default setting 1.0 will disable this parameter.							
Setting:	See P0810							
Dependency:	For digital inputs as command source BICO requires P0700 set to 2 (enable BICO). If one of the digital inputs is selected for ON/OFF2, the converter will not run unless the digital input is active. OFF2 means immediate pulse-disabling; the motor is coasting. OFF2 is low-active, i.e. :0 = Pulse disabling. 1 = Pulses enabled. (As long as there are no other OFF conditions active).							
Note:	The ON/OFF2 functionality is not supported in 2/3 wire modes. Do not select ON/OFF2 unless P0727 = 0.							
P0844[0...2]	**BI: 1. OFF2**	0 - 4294967295	19.1	T	-	CDS	U32	3
	Defines first source of OFF2 when P0719 = 0 (BICO).							
Setting:	See P0810							
Dependency:	If one of the digital inputs is selected for OFF2, the converter will not run unless the digital input is active.							
Note:	OFF2 means immediate pulse-disabling; the motor is coasting. OFF2 is low-active, i.e.: 0 = Pulse disabling. 1 = Operating condition.							
P0845[0...2]	**BI: 2. OFF2**	0 - 4294967295	1	T	-	CDS	U32	3
	Defines second source of OFF2.							
Setting:	See P0810							
Dependency:	In contrast to P0844 (first source of OFF2), this parameter is always active, independent of P0719 (selection of command and frequency setpoint). See P0844.							
Note:	See P0844							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P0848[0...2]	**BI: 1. OFF3**	0 - 4294967295	1	T	-	CDS	U32	3
	Defines first source of OFF3 when P0719 = 0 (BICO).							
Setting:	See P0810							
Dependency:	If one of the digital inputs is selected for OFF3, the converter will not run unless the digital input is active.							
Note:	OFF3 means quick ramp-down to 0. OFF3 is low-active, i.e. 0 = Quick ramp-down. 1 = Operating condition.							
P0849[0...2]	**BI: 2. OFF3**	0 - 4294967295	1	T	-	CDS	U32	3
	Defines second source of OFF3.							
Setting:	See P0810							
Dependency:	In contrast to P0848 (first source of OFF3), this parameter is always active, independent of P0719 (selection of command and frequency setpoint). See P0848.							
Note:	See P0848							
P0852[0...2]	**BI: Pulse enable**	0 - 4294967295	1	T	-	CDS	U32	3
	Defines source of pulse enable/disable signal.							
Setting:	See P0810							
Dependency:	Active only when P0719 = 0 (Auto selection of command/setpoint source).							
P0881[0...2]	**BI: Quick stop source 1**	0 - 4294967295	1	T	-	CDS	U32	3
	Allows quick stop source 1 command to be selected using BICO. The signal is expected to be active low (default setting P0886 = 2).							
Setting:	See P0810							
P0882[0...2]	**BI: Quick stop source 2**	0 - 4294967295	1	T	-	CDS	U32	3
	Allows quick stop source 2 command to be selected using BICO. The signal is expected to be active low (default setting P0886 = 2).							
Setting:	See P0810							
P0883[0...2]	**BI: Quick stop override**	0 - 4294967295	0	T	-	CDS	U32	3
	Allows quick stop override command source to be selected using BICO. The signal is expected to be active high.							
Setting:	See P0810							
P0886[0...2]	**Quick stop input type**	0 - 4	2	T	-	CDS	U16	3
	Control Word for selecting the quick stop input type.							
	0	Quick stop not selected						
	1	Quick stop input active high						
	2	Quick stop input active low						
	3	Quick stop input positive edge triggered						
	4	Quick stop input negative edge triggered						

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P0927	**Parameter changeable via specified interfaces**	0 - 31	31	U, T	-	-	U16	2
	Specifies the interfaces which can be used to change parameters. This parameter allows the user to easily protect the converter from unauthorized modification of parameters. Annotation: P0927 is not password protected.							
	Bit	**Signal name**			**1 signal**		**0 signal**	
	00	Not used			Yes		No	
	01	BOP (including built-in BOP and external BOP)			Yes		No	
	02	USS on RS232			Yes		No	
	03	USS on RS485			Yes		No	
	04	Script terminal on RS485			Yes		No	
Example:	Default: All bits are set. The default setting allows parameters to be changed via any interface.							
r0944	**Total number of messages**	-	-	-	-	-	U16	3
	Displays the total number of messages available.							
r0947[0...63]	**CO: Last fault code**	-	-	-	-	-	U16	2
	Displays fault history. 							
Index:	[0]	Recent fault trip --, fault 1						
	...	...						
	[7]	Recent fault trip --, fault 8						
	[8]	Recent fault trip -1, fault 1						
	...	...						
	[15]	Recent fault trip -1, fault 8						
	[16]	Recent fault trip -2, fault 1						
	...	...						
	[23]	Recent fault trip -2, fault 8						
	...	...						
	[63]	Recent fault trip -7, fault 8						

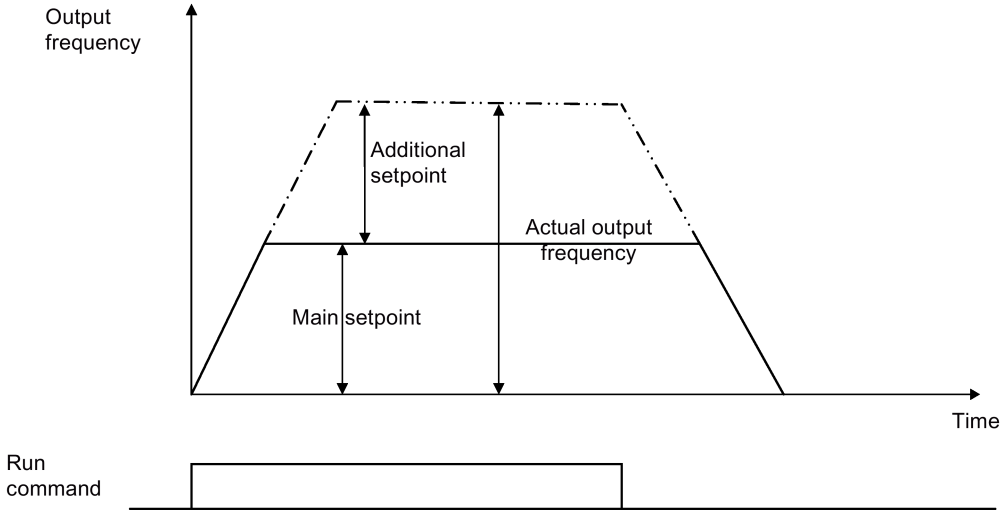
Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
Notice:	It is possible that this parameter is empty but a fault is still indicated by the converter. The reason for this is most likely due to a SAFE condition still existing in the system. In this situation the fault is cleared from this parameter and it makes no sense to go back to a READY state. First remove the reason for the SAFE condition and then the converter will be able to change to a READY state (SAFE condition example is "safety function is activated").							
Note:	The function "converter status at fault" (Page 333) serves as a snapshot record in time of the relative parameters being monitored at the point of a fault occurring. Some recorded parameters are filtered values. Therefore if a hardware trip occurs, (r0949 = 0), some filtered values may not appear to reflect those values which caused the trip.							
Example:	If a hardware overvoltage trip occurs, (r0947 = 2 and r0949 = 0), the value of the filtered DC link voltage in r0956 may appear to be under the trip limit. In this case, the filtered DC link value had not had enough time to rise to the trip level; however, the actual limit had been exceeded and hence the hardware had tripped to protect itself.							
r0948[0...63]	**Fault time**	-	-	-	-	-	U32	3
	Time stamp to indicate when a fault has occurred. P0969 (system run time counter) is the possible source of the time stamp.							
Index:	[0]	Recent fault trip --, fault time 1						
	...	...						
	[7]	Recent fault trip --, fault time 8						
	[8]	Recent fault trip -1, fault time 1						
	...	...						
	[15]	Recent fault trip -1, fault time 8						
	[16]	Recent fault trip -2, fault time 1						
	...	...						
	[23]	Recent fault trip -2, fault time 8						
	...	...						
	[63]	Recent fault trip -7, fault time 8						
r0949[0...63]	**CO: Fault value**	-	-	-	-	-	U32	3
	Displays converter fault values. It is for service purposes and indicates the type of fault reported. The values are not documented. They are listed in the code where faults are reported.							
Index:	[0]	Recent fault trip --, fault value 1						
	...	...						
	[7]	Recent fault trip --, fault value 8						
	[8]	Recent fault trip -1, fault value 1						
	...	...						
	[15]	Recent fault trip -1, fault value 8						
	[16]	Recent fault trip -2, fault value 1						
	...	...						
	[23]	Recent fault trip -2, fault value 8						
	...	...						
	[63]	Recent fault trip -7, fault value 8						
P0952	**Total number of trips**	0 - 65535	0	T	-	-	U16	3
	Displays number of trips stored in r0947 (last fault code).							
Dependency:	Setting 0 resets fault history (changing to 0 also resets r0948 - fault time).							
Note:	If the source of a non-momentary fault remains active before a factory reset, the converter removes the source first and then places the fault into the fault history during a factory reset. That means P0952 still has a non-zero value after the factory reset. If you want to clear the fault history, you need to perform a second factory reset or set P0952 = 0.							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
r0954[0...2]	**CO: Freq. setpoint after RFG at fault [Hz]**	-	-	-	-	-	Float	3
	Displays the setpoint after RFG when the first instantaneous fault occurs (see r1170).							
Index:	[0]	Recent trip - Fault information						
	[1]	Recent trip - 1 Fault information						
	[2]	Recent trip - 2 Fault information						
Note:	Only one set of fault information is stored per block of instantaneous faults. r0954[0] corresponds to r0947[0...7], r0954[1] corresponds to r0947[8...15] and r0954[2] corresponds to r0947[16...23].							
r0955[0...2]	**CO/BO: Status word 2 at fault**	-	-	-	-	-	U16	3
	Displays status word 2 when the first instantaneous fault occurs (see r0053).							
Index:	[0]	Recent trip - Fault information						
	[1]	Recent trip - 1 Fault information						
	[2]	Recent trip - 2 Fault information						
Note:	Only one set of fault information is stored per block of instantaneous faults. r0955[0] corresponds to r0947[0...7], r0955[1] corresponds to r0947[8...15] and r0955[2] corresponds to r0947[16...23].							
r0956[0...2]	**CO: DC-link voltage at fault [V]**	-	-	-	-	-	Float	3
	Displays the DC link voltage when the first instantaneous fault occurs (see r0026).							
Index:	[0]	Recent trip - Fault information						
	[1]	Recent trip - 1 Fault information						
	[2]	Recent trip - 2 Fault information						
Note:	Only one set of fault information is stored per block of instantaneous faults. r0956[0] corresponds to r0947[0...7], r0956[1] corresponds to r0947[8...15] and r0956[2] corresponds to r0947[16...23].							
r0957[0...2]	**CO: Act. output current at fault [A]**	-	-	-	-	-	Float	3
	Displays the output current RMS when the first instantaneous fault occurs (see r0027).							
Index:	[0]	Recent trip - Fault information						
	[1]	Recent trip - 1 Fault information						
	[2]	Recent trip - 2 Fault information						
Note:	Only one set of fault information is stored per block of instantaneous faults. r0957[0] corresponds to r0947[0...7], r0957[1] corresponds to r0947[8...15] and r0957[2] corresponds to r0947[16...23].							
r0958[0...2]	**CO: Act. output voltage at fault [V]**	-	-	-	-	-	Float	3
	Displays the output voltage when the first instantaneous fault occurs (see r0025).							
Index:	[0]	Recent trip - Fault information						
	[1]	Recent trip - 1 Fault information						
	[2]	Recent trip - 2 Fault information						
Note:	Only one set of fault information is stored per block of instantaneous faults. r0958[0] corresponds to r0947[0...7], r0958[1] corresponds to r0947[8...15] and r0958[2] corresponds to r0947[16...23].							
r0964[0...6]	**Firmware version data**	-	-	-	-	-	U16	3
	Firmware version data.							
Index:	[0]	Company (Siemens = 42)						
	[1]	Product type (V20 = 8001)						
	[2]	Firmware version						
	[3]	Firmware date (year)						
	[4]	Firmware date (day/month)						
	[5]	Number of converter objects						
	[6]	Firmware version						

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
r0967	**Control word 1**	-	-	-	-	-	U16	3
	Displays control word 1. See r0054 for the bit field description.							
r0968	**Status word 1**	-	-	-	-	-	U16	3
	Displays active status word of converter (in binary) and can be used to diagnose which commands are active. See r0052 for the bit field description.							
P0969	**Resettable system run time counter**	0 - 4294967295	0	T	-	-	U32	3
	Resettable system run time counter.							
P0970	**Factory reset**	0 - 31	0	C(30)	-	-	U16	1
	P0970 = 1: Resets all parameters (not user defaults) to user defaults if they have been previously stored with P0971 = 21; otherwise, resets all parameters to factory defaults P0970 = 21: Resets all parameters and user defaults to factory defaults P0970 = 31: Special factory reset. Resets all user defaults in EEPROM to factory defaults. When resetting all parameters by setting P0970 = 1 or P0970 = 21, please note the following aspects: • When you reset parameters through the BOP, parameters in both RAM and EEPROM are reset. • When you select USS/MODBUS communication on RS485 and the volatile storage mode (P0014[0] = 0), only parameters in RAM are reset. • When you select USS/MODBUS communication on RS485 and the non-volatile storage mode (P0014[0] =1), parameters in both RAM and EEPROM are reset.							
	0	Disabled						
	1	Parameter reset						
	21	User Default Parameter Reset						
	31	Special factory reset						
Notice:	Setting P0970 = 31 resets all user defaults in EEPROM to factory defaults. The converter will then restart. Note that this value setting is used only as one remedy for clearing the fault F51.							
Dependency:	First set P0010 = 30 (factory settings). Stop converter (i.e. disable all pulses) before you can reset parameters to default values.							
Note:	The following parameters retain their values after a factory reset with P0970 =1 or 21: • r0039 CO: Energy consumption meter [kWh] • P0014 Store mode • P0100 Europe/North America • P0205 Converter application • P2010 USS/MODBUS baudrate • P2011 USS address • P2021 MODBUS address • P2023 RS485 protocol selection • P8458 Clone control When transferring P0970, the converter uses its processor to carry out internal calculations. Communications are interrupted for the time that it takes to make these calculations.							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P0971	**Transfer data from RAM to EEPROM**	0 - 21	0	U, T	-	-	U16	3
	Transfers values from RAM to EEPROM when set to 1. Transfers new user default values from RAM to EEPROM when set to 21.							
	0	Disabled						
	1	Start transfer						
	21	Start User Defaults 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. • BOP displays 88888 After completion of the transfer process, the communication between the converter and external peripherals (BOP, USS or Modbus Master) is automatically re-established.							
r0980[0...99]	**List of available parameter numbers**	0 - 65535	981	-	-	-	U16	4
	Contains 100 parameter numbers index 0 - 99.							
Index:	[0]	Parameter 1						
	[1]	Parameter 2						
	...	...						
	[98]	Parameter 99						
	[99]	Next parameter list						
Note:	The parameter list array has 2 elements to reduce memory consumption. On each access to an element index 0 - 99, the individual result is determined dynamically by the 'BeforeAccess' function. The last element contains the number of the following parameter array, 0 indicates end of list.							
r0981[0...99]	**List of available parameter numbers**	0 - 65535	982	-	-	-	U16	4
	Contains 100 parameter numbers index 100 - 199.							
Index:	See r0980							
Note:	See r0980							
r0982[0...99]	**List of available parameter numbers**	0 - 65535	983	-	-	-	U16	4
	Contains 100 parameter numbers index 200 - 299.							
Index:	See r0980							
Note:	See r0980							
r0983[0...99]	**List of available parameter numbers**	0 - 65535	984	-	-	-	U16	4
	Contains 100 parameter numbers index 300 - 399.							
Index:	See r0980							
Note:	See r0980							
r0984[0...99]	**List of available parameter numbers**	0 - 65535	985	-	-	-	U16	4
	Contains 100 parameter numbers index 400 - 499.							
Index:	See r0980							
Note:	See r0980							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
r0985[0...99]	**List of available parameter numbers**	0 - 65535	986	-	-	-	U16	4
	Contains 100 parameter numbers index 500 - 599.							
Index:	See r0980							
Note:	See r0980							
r0986[0...99]	**List of available parameter numbers**	0 - 65535	987	-	-	-	U16	4
	Contains 100 parameter numbers index 600 - 699.							
Index:	See r0980							
Note:	See r0980							
r0987[0...99]	**List of available parameter numbers**	0 - 65535	988	-	-	-	U16	4
	Contains 100 parameter numbers index 700 - 799.							
Index:	See r0980							
Note:	See r0980							
r0988[0...99]	**List of available parameter numbers**	0 - 65535	989	-	-	-	U16	4
	Contains 100 parameter numbers index 800 - 899.							
Index:	See r0980							
Note:	See r0980							
r0989[0...99]	**List of available parameter numbers**	0 - 65535	0	-	-	-	U16	4
	Contains 100 parameter numbers index 900 - 999.							
Index:	See r0980							
Note:	See r0980							
P1000[0...2]	**Selection of frequency setpoint**	0 - 77	1	C, T	-	CDS	U16	1
	Selects frequency setpoint source. The main setpoint is given by the least significant digit (right-hand position) and the additional setpoint is given by the most significant digit (left-hand position). Single digits denote main setpoints that have no additional setpoint.							



Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
	0	No main setpoint						
	1	MOP setpoint						
	2	Analog setpoint 1						
	3	Fixed frequency						
	5	USS/MODBUS on RS485						
	7	Analog setpoint 2						
	10	No main setpoint + MOP setpoint						
	11	MOP setpoint + MOP setpoint						
	12	Analog setpoint 1 + MOP setpoint						
	13	Fixed frequency + MOP setpoint						
	15	USS/MODBUS on RS485 + MOP setpoint						
	17	Analog setpoint 2 + MOP setpoint						
	20	No main setpoint + Analog setpoint 1						
	21	MOP setpoint + Analog setpoint 1						
	22	Analog setpoint 1 + Analog setpoint 1						
	23	Fixed frequency + Analog setpoint 1						
	25	USS/MODBUS on RS485 + Analog setpoint 1						
	27	Analog setpoint 2 + Analog setpoint 1						
	30	No main setpoint + Fixed frequency						
	31	MOP setpoint + Fixed frequency						
	32	Analog setpoint 1 + Fixed frequency						
	33	Fixed frequency + Fixed frequency						
	35	USS/MODBUS on RS485 + Fixed frequency						
	37	Analog setpoint 2 + Fixed frequency						
	50	No main setpoint + USS/MODBUS on RS485						
	51	MOP setpoint + USS/MODBUS on RS485						
	52	Analog setpoint 1 + USS/MODBUS on RS485						
	53	Fixed frequency + USS/MODBUS on RS485						
	55	USS/MODBUS on RS485 + USS/MODBUS on RS485						
	57	Analog setpoint 2 + USS/MODBUS on RS485						
	70	No main setpoint + Analog setpoint 2						
	71	MOP setpoint + Analog setpoint 2						
	72	Analog setpoint 1 + Analog setpoint 2						
	73	Fixed frequency + Analog setpoint 2						
	75	USS/MODBUS on RS485 + Analog setpoint 2						
	77	Analog setpoint 2 + Analog setpoint 2						
Dependency:	Related parameter: P1074 (BI: Disable additional setpoint)							
Caution:	Changing this parameter sets (to default) all settings on item selected. These are the following parameters: P1070, P1071, P1075, P1076 If P1000 = 1 or 1X, and P1032 (inhibit reverse direction of MOP) = 1, then reverse motor direction will be inhibited.							
Note:	RS485 also supports MODBUS protocol as well as USS. All USS options on RS485 are also applicable to MODBUS. To alter the setpoint using the BOP when the command source P0700 is not set to 1, you must check that P1035 is set to r0019 bit 13 and P1036 is set to r0019 bit 14.							

<table>
<tr><th>Parameter</th><th>Function</th><th>Range</th><th>Factory default</th><th>Can be changed</th><th>Scaling</th><th>Data set</th><th>Data type</th><th>Acc. Level</th></tr>
<tr><td>P1001[0...2]</td><td>Fixed frequency 1 [Hz]</td><td>-550.00 - 550.00</td><td>10.00</td><td>U, T</td><td>-</td><td>DDS</td><td>Float</td><td>2</td></tr>
<tr><td></td><td colspan="8">Defines fixed frequency setpoint 1. There are 2 types of fixed frequencies:
• Direct selection (P1016 = 1):
– In this mode, 1 fixed frequency selector (P1020 to P1023) selects 1 fixed frequency (P1001 to P1004).
– If several inputs are active together, the selected frequencies are summed.
Example: fixed frequency 1 (P1001) + fixed frequency 2 (P1002) + fixed frequency 3 (P1003) + fixed frequency 4 (P1004).
• Binary coded selection (P1016 = 2):
– Up to 16 different fixed frequency values can be selected using this method.
<table><tr><th colspan="4">Fixed frequency selection bit</th><th>Binary code</th><th>Fixed frequency 1 to 15 (Hz)</th></tr><tr><td>P1023</td><td>P1022</td><td>P1021</td><td>P1020</td><td></td><td></td></tr><tr><td colspan="4">-</td><td>0</td><td>0</td></tr><tr><td></td><td></td><td></td><td>1</td><td>1</td><td>P1001</td></tr><tr><td></td><td></td><td>1</td><td></td><td>2</td><td>P1002</td></tr><tr><td></td><td></td><td>1</td><td>1</td><td>3</td><td>P1003</td></tr><tr><td></td><td>1</td><td></td><td></td><td>4</td><td>P1004</td></tr><tr><td></td><td>1</td><td></td><td>1</td><td>5</td><td>P1005</td></tr><tr><td></td><td>1</td><td>1</td><td></td><td>6</td><td>P1006</td></tr><tr><td></td><td>1</td><td>1</td><td>1</td><td>7</td><td>P1007</td></tr><tr><td>1</td><td></td><td></td><td></td><td>8</td><td>P1008</td></tr><tr><td>1</td><td></td><td></td><td>1</td><td>9</td><td>P1009</td></tr><tr><td>1</td><td></td><td>1</td><td></td><td>10</td><td>P1010</td></tr><tr><td>1</td><td></td><td>1</td><td>1</td><td>11</td><td>P1011</td></tr><tr><td>1</td><td>1</td><td></td><td></td><td>12</td><td>P1012</td></tr><tr><td>1</td><td>1</td><td></td><td>1</td><td>13</td><td>P1013</td></tr><tr><td>1</td><td>1</td><td>1</td><td></td><td>14</td><td>P1014</td></tr><tr><td>1</td><td>1</td><td>1</td><td>1</td><td>15</td><td>P1015</td></tr></table>See P1020 to P1023 for assigning desired digital inputs to the fixed frequency bits.</td></tr>
<tr><td>Dependency:</td><td colspan="8">Select fixed frequency operation (using P1000).
Converter requires ON command to start in the case of direct selection. Therefore r1025 must be connected to P0840 to start.</td></tr>
<tr><td>Note:</td><td colspan="8">Fixed frequencies can be selected using the digital inputs.</td></tr>
<tr><td>P1002[0...2]</td><td>Fixed frequency 2 [Hz]</td><td>-550.00 - 550.00</td><td>15.00</td><td>U, T</td><td>-</td><td>DDS</td><td>Float</td><td>2</td></tr>
<tr><td></td><td colspan="8">Defines fixed frequency setpoint 2.</td></tr>
<tr><td>Note:</td><td colspan="8">See P1001</td></tr>
<tr><td>P1003[0...2]</td><td>Fixed frequency 3 [Hz]</td><td>-550.00 - 550.00</td><td>25.00</td><td>U, T</td><td>-</td><td>DDS</td><td>Float</td><td>2</td></tr>
<tr><td></td><td colspan="8">Defines fixed frequency setpoint 3.</td></tr>
<tr><td>Note:</td><td colspan="8">See P1001</td></tr>
<tr><td>P1004[0...2]</td><td>Fixed frequency 4 [Hz]</td><td>-550.00 - 550.00</td><td>50.00</td><td>U, T</td><td>-</td><td>DDS</td><td>Float</td><td>2</td></tr>
<tr><td></td><td colspan="8">Defines fixed frequency setpoint 4.</td></tr>
<tr><td>Note:</td><td colspan="8">See P1001</td></tr>
<tr><td>P1005[0...2]</td><td>Fixed frequency 5 [Hz]</td><td>-550.00 - 550.00</td><td>0.00</td><td>U, T</td><td>-</td><td>DDS</td><td>Float</td><td>2</td></tr>
<tr><td></td><td colspan="8">Defines fixed frequency setpoint 5.</td></tr>
<tr><td>Note:</td><td colspan="8">See P1001</td></tr>
<tr><td>P1006[0...2]</td><td>Fixed frequency 6 [Hz]</td><td>-550.00 - 550.00</td><td>0.00</td><td>U, T</td><td>-</td><td>DDS</td><td>Float</td><td>2</td></tr>
<tr><td></td><td colspan="8">Defines fixed frequency setpoint 6.</td></tr>
<tr><td>Note:</td><td colspan="8">See P1001</td></tr>
</table>

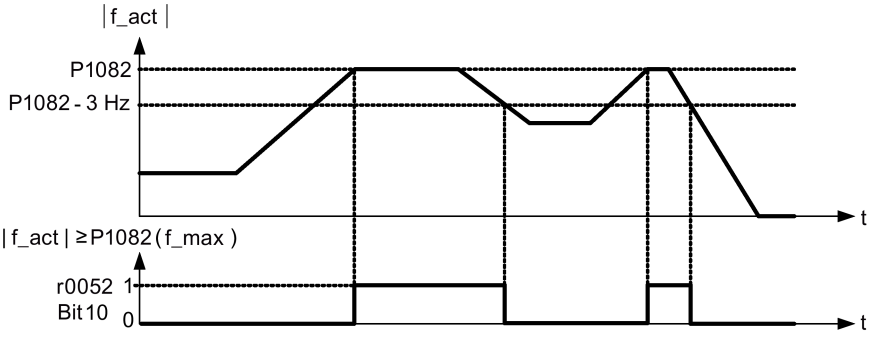
Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P1007[0...2]	**Fixed frequency 7 [Hz]**	-550.00 - 550.00	0.00	U, T	-	DDS	Float	2
	Defines fixed frequency setpoint 7.							
Note:	See P1001							
P1008[0...2]	**Fixed frequency 8 [Hz]**	-550.00 - 550.00	0.00	U, T	-	DDS	Float	2
	Defines fixed frequency setpoint 8.							
Note:	See P1001							
P1009[0...2]	**Fixed frequency 9 [Hz]**	-550.00 - 550.00	0.00	U, T	-	DDS	Float	2
	Defines fixed frequency setpoint 9.							
Note:	See P1001							
P1010[0...2]	**Fixed frequency 10 [Hz]**	-550.00 - 550.00	0.00	U, T	-	DDS	Float	2
	Defines fixed frequency setpoint 10.							
Note:	See P1001							
P1011[0...2]	**Fixed frequency 11 [Hz]**	-550.00 - 550.00	0.00	U, T	-	DDS	Float	2
	Defines fixed frequency setpoint 11.							
Note:	See P1001							
P1012[0...2]	**Fixed frequency 12 [Hz]**	-550.00 - 550.00	0.00	U, T	-	DDS	Float	2
	Defines fixed frequency setpoint 12.							
Note:	See P1001							
P1013[0...2]	**Fixed frequency 13 [Hz]**	-550.00 - 550.00	0.00	U, T	-	DDS	Float	2
	Defines fixed frequency setpoint 13.							
Note:	See P1001							
P1014[0...2]	**Fixed frequency 14 [Hz]**	-550.00 - 550.00	0.00	U, T	-	DDS	Float	2
	Defines fixed frequency setpoint 14.							
Note:	See P1001							
P1015[0...2]	**Fixed frequency 15 [Hz]**	-550.00 - 550.00	0.00	U, T	-	DDS	Float	2
	Defines fixed frequency setpoint 15.							
Note:	See P1001							
P1016[0...2]	**Fixed frequency mode**	1 - 2	1	T	-	DDS	U16	2
	Fixed frequencies can be selected in two different modes. P1016 defines the mode.							
	1	Direct selection						
	2	Binary selection						
Note:	See P1001 for description of how to use fixed frequencies.							
P1020[0...2]	**BI: Fixed frequency selection Bit 0**	0 - 4294967295	722.3	T	-	CDS	U32	3
	Defines origin of fixed frequency selection.							
Example:	= 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 (requires P0704 to be set to 99, BICO)						
Dependency:	Accessible only if P0701 - P070x = 99 (function of digital inputs = BICO)							
P1021[0...2]	**BI: Fixed frequency selection Bit 1**	0 - 4294967295	722.4	T	-	CDS	U32	3
	See P1020							

Parameter	Function		Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P1022[0...2]	**BI: Fixed frequency selection Bit 2**		0 - 4294967295	722.5	T	-	CDS	U32	3
	See P1020								
P1023[0...2]	**BI: Fixed frequency selection Bit 3**		0 - 4294967295	722.6	T	-	CDS	U32	3
	See P1020								
r1024	**CO: Actual fixed frequency [Hz]**		-	-	-	-	-	Float	3
	Displays sum total of selected fixed frequencies.								
r1025.0	**BO: Fixed frequency status**		-	-	-	-	-	U16	3
	Displays the status of fixed frequencies.								
	Bit	**Signal name**				**1 signal**		**0 signal**	
	00	Status of FF				Yes		No	
P1031[0...2]	**MOP mode**		0 - 3	1	U, T	-	DDS	U16	2
	MOP mode specification.								
	Bit	**Signal name**				**1 signal**		**0 signal**	
	00	Setpoint store active				Yes		No	
	01	No On-state for MOP necessary				Yes		No	
Note:	Defines the operation mode of the motorized potentiometer. See P1040.								
P1032	**Inhibit reverse direction of MOP**		0 - 1	1	T	-	-	U16	2
	Inhibits reverse setpoint selection of the MOP.								
	0		Reverse direction is allowed						
	1		Reverse direction inhibited						
Note:	It is possible to change motor direction using the motor potentiometer setpoint (increase/decrease frequency). Setting 0 enables a change of motor direction using the motor potentiometer setpoint (increase/decrease frequency). If P1032 = 1 and P1000 = 1 or 1X, then reverse motor direction will be inhibited.								
P1035[0...2]	**BI: Enable MOP (UP-command)**		0 - 4294967295	19.13	T	-	CDS	U32	3
	Defines source for motor potentiometer setpoint increase frequency.								
Setting:	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:	If this command is enabled by short pulses of less than 1 second, the frequency is changed in steps of 0.1 Hz. When the signal is enabled longer than 1 second the ramp generator accelerates with the rate of P1047.								
P1036[0...2]	**BI: Enable MOP (DOWN-command)**		0 - 4294967295	19.14	T	-	CDS	U32	3
	Defines source for motor potentiometer setpoint decrease frequency.								
Setting:	See P1035								
Notice:	If this command is enabled by short pulses of less than 1 second, the frequency is changed in steps of 0.1 Hz. When the signal is enabled longer than 1 second the ramp generator decelerates with the rate of P1048.								

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P1040[0...2]	**Setpoint of the MOP [Hz]**	-550.00 - 550.00	5.00	U, T	-	DDS	Float	2
	Determines setpoint for motor potentiometer control (P1000 = 1).							
Dependency:	Motor potentiometer (P1040) must be chosen as main setpoint or additional setpoint (using P1000).							
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. A short press of the 'up' or 'down' keys (e.g.: operator panel) will change the frequency setpoint in steps of 0.1 Hz. A longer press will cause an accelerated frequency setpoint change. The start value gets active (for the MOP output) only at the start of the MOP. P1031 influences the start value behavior as follows: • P1031 = 0: Last MOP setpoint not saved in P1040 MOP UP/DOWN requires an ON command to become active. • P1031 = 1: Last MOP setpoint saved in P1040 on every OFF MOP UP/DOWN requires an ON command to become active (default). • P1031 = 2: Last MOP setpoint not saved in P1040 MOP UP/DOWN active without additional ON command. • P1031 = 3: Last MOP setpoint saved in P1040 on powering-up MOP UP/DOWN active without additional ON command.							
P1041[0...2]	**BI: MOP select setpoint automatically/manually**	0 - 4294967295	0	T	-	CDS	U32	3
	Sets the signal source to change over from manual to automatic mode. If using the motorized potentiometer in the manual mode the setpoint is changed using two signals for up and down e.g. P1035 and P1036. If using the automatic mode the setpoint must be interconnected via the connector input (P1042). 0: manually 1: automatically							
Notice:	Refer to: P1035, P1036, P1042							
P1042[0...2]	**CI: MOP auto setpoint**	0 - 4294967295	0	T	-	CDS	U32	3
	Sets the signal source for the setpoint of the motorized potentiometer if automatic mode P1041 is selected.							
Notice:	Refer to: P1041							
P1043[0...2]	**BI: MOP accept rampgenerator setpoint**	0 - 4294967295	0	T	-	CDS	U32	3
	Sets the signal source for the setting command to accept the setting value for the motorized potentiometer. The value becomes effective for a 0/1 edge of the setting command.							
Notice:	Refer to: P1044							
P1044[0...2]	**CI: MOP rampgenerator setpoint**	0 - 4294967295	0	T	-	CDS	U32	3
	Sets the signal source for the setpoint value for the MOP. The value becomes effective for a 0/1 edge of the setting command.							
Notice:	Refer to: P1043							
r1045	**CO: MOP input frequency of the RFG [Hz]**	-	-	-	-	-	Float	3
	Displays the motorized potentiometer setpoint before it passed the MOP RFG.							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P1046	**MOP step increment [Hz]**	0.1-10	0.1	U, T	-	DDS	Float	3
	Sets the MOP step increment.							
Notice:	Step increment is used only for MOP rather than PID-MOP.							
Note:	Short press of the Up or Down button on the BOP increases or decreases the MOP setpoint respectively by the value set in P1046. Long press of the Up or Down button increases or decreases the MOP setpoint respectively at a frequency change rate depending on P1047 (MOP ramp-up time of the RFG[s]) or P1048 (MOP ramp-down time of the RFG[s]). With long press, the MOP input goes to the maximum value (see r1045), but the MOP output ramps up along with MOP ramping time (see r1050).							
P1047[0...2]	**MOP ramp-up time of the RFG [s]**	0.00 - 1000.00	10.00	U, T	-	DDS	Float	2
	Sets the ramp-up time for the internal MOP ramp-function generator. The setpoint is changed from zero up to limit defined in P1082 within this time.							
Notice:	Refer to: P1048, P1082							
P1048[0...2]	**MOP ramp-down time of the RFG [s]**	0.00 - 1000.0	10.00	U, T	-	DDS	Float	2
	Sets the ramp-down time for the internal MOP ramp-function generator. The setpoint is changed from limit defined in P1082 down to zero within this time.							
Notice:	Refer to: P1047, P1082							
r1050	**CO: Actual output freq. of the MOP [Hz]**	-	-	-	-	-	Float	2
	Displays output frequency of motor potentiometer setpoint.							
P1055[0...2]	**BI: Enable JOG right**	0 - 4294967295	19.8	T	-	CDS	U32	3
	Defines source of JOG right when P0719 = 0 (Auto selection of command/setpoint source).							
P1056[0...2]	**BI: Enable JOG left**	0 - 4294967295	0	T	-	CDS	U32	3
	Defines source of JOG left when P0719 = 0 (Auto selection of command/setpoint source).							
P1057	**JOG enable**	0 - 1	1	T	-	-	U16	3
	While JOG enable is '0' Jogging (P1056 and P1055) is disabled. When '1' Jogging is enabled.							
P1058[0...2]	**JOG frequency [Hz]**	0.00 - 550.00	5.00	U, T	-	DDS	Float	2
	Jogging increases the motor speed by small amounts. The JOG mode allows the operator to perform a specific number of revolutions and position the rotor manually. In JOG mode, the RUN button on the operator panel for jogging uses a non-latching switch on one of the digital inputs to control the motor speed. While jogging, P1058 determines the frequency at which the converter will run. The motor speed is increased as long as 'JOG left' or 'JOG right' are selected and until the left or right JOG frequency is reached.							
Dependency:	P1060 and P1061 set up and down ramp times respectively for jogging. Rounding times (P1130 - P1133), rounding type (P1134) and P2167 will also have influence on the JOG ramp.							
P1059[0...2]	**JOG frequency left [Hz]**	0.00 - 550.00	5.00	U, T	-	DDS	Float	2
	While JOG left is selected, this parameter determines the frequency at which the converter will run.							
Dependency:	P1060 and P1061 set up and down ramp times respectively for jogging.							
P1060[0...2]	**JOG ramp-up time [s]**	0.00 - 650.00	10.00	U, T	-	DDS	Float	2
	Sets jog ramp-up time. This is the time used while jogging is active.							
Dependency:	See also P3350, P3353.							
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 The rounding of P1130 - P1133 also applies to the JOG ramping.							
Note:	If the SuperTorque function is enabled, the converter will initially ramp using the value in P3353.							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P1061[0...2]	**JOG ramp-down time [s]**	0.00 - 650.00	10.00	U, T	-	DDS	Float	2
	Sets ramp-down time. This is the time used while jogging is active.							
Dependency:	See also P3350, P3353.							
Note:	See P1060							
P1070[0...2]	**CI: Main setpoint**	0 - 4294967295	1050[0]	T	-	CDS	U32	3
	Defines source of main setpoint.							
Setting:	755	Analog input 1 setpoint						
	1024	Fixed frequency setpoint						
	1050	Motor potentiometer (MOP) setpoint						
P1071[0...2]	**CI: Main setpoint scaling**	0 - 4294967295	1	T	4000H	CDS	U32	3
	Defines source of the main setpoint scaling.							
Setting:	See P1070							
P1074[0...2]	**BI: Disable additional setpoint**	0 - 4294967295	0	U, T	-	CDS	U32	3
	Disables additional setpoint.							
Setting:	See P1070							
P1075[0...2]	**CI: Additional setpoint**	0 - 4294967295	0	T	-	CDS	U32	3
	Defines source of the additional setpoint (to be added to main setpoint).							
Setting:	See P1070							
P1076[0...2]	**CI: Additional setpoint scaling**	0 - 4294967295	[0] 1 [1] 0 [2] 1	T	4000H	CDS	U32	3
	Defines source of scaling for additional setpoint (to be added to main setpoint).							
Setting:	1	Scaling of 1.0 (100%)						
	755	Analog input 1 setpoint						
	1024	Fixed frequency setpoint						
	1050	MOP setpoint						
r1078	**CO: Total frequency setpoint [Hz]**	-	-	-	-	-	Float	3
	Displays sum of main and additional setpoints.							
r1079	**CO: Selected frequency setpoint [Hz]**	-	-	-	-	-	Float	3
	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.							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P1080[0...2]	**Minimum frequency [Hz]**	0.00 - 550.00	0.00	C, U, T	-	DDS	Float	1
	Sets minimum motor frequency 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. analog input, 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. Furthermore, an overshoot of the actual frequency f_act upper minimum frequency P1080 is output by the signal function |f_act| > f_min.							
Note:	Value set here is valid both for clockwise and for counterclockwise rotation. Under certain conditions (e.g. ramping, current limiting), motor can run below minimum frequency.							
P1082[0...2]	**Maximum frequency [Hz]**	0.00 - 550.00	50.00	C, T	-	DDS	Float	1
	Sets maximum motor frequency at which motor will run irrespective of the frequency setpoint. The value set here is valid for both clockwise and counterclockwise rotation. Furthermore, the monitoring function |f_act| >= P1082 (r0052 bit 10, see example below) is affected by this parameter.							
Example:								
Dependency:	The maximum value of P1082 also depends on the nominal frequency: Max. P1082 = min (15*P0310, 550.0 Hz). As consequence P1082 can be affected if P0310 is changed to a smaller value. The maximum frequency and the pulse frequency depending on each other. The maximum frequency affects the pulse frequency according to the following table.							

	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 - 550.0 Hz

Example:

If P1082 is set to 350 Hz a pulse frequency from at least 6 kHz is necessary. If P1800 is smaller than 6 kHz the parameter is changed P1800 = 6 kHz.

The maximum output frequency of converter 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):

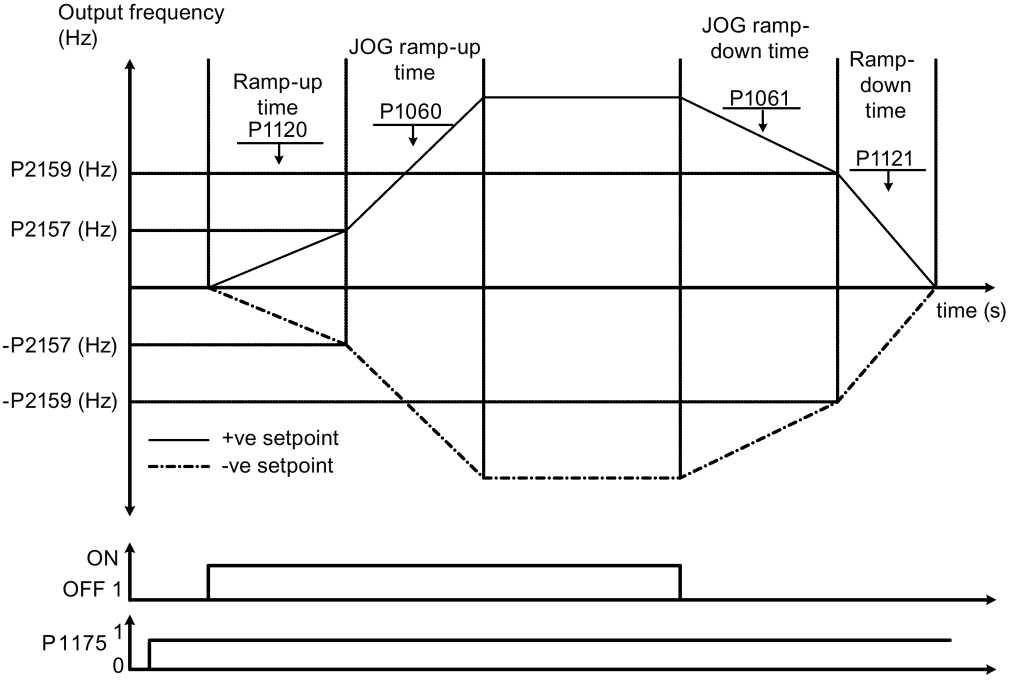
$$f_{max}\ (P1200) = f_{max} + 2 \cdot f_{slip,nom} = P1082 + 2 \cdot \frac{r0330}{100} \cdot P0310$$

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
Note:	When using the setpoint source • Analog Input • USS the setpoint frequency (in Hz) is cyclically calculated using • a percentage value(e.g. for the analog input r0754) • 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 parameterized 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. When Quick Commissioning is carried out P2000 is changed as follows: P2000 = P1082.							
r1084	**Resultant maximum frequency [Hz]**	-	-	-	-	-	Float	3
	Displays resultant maximum frequency.							
P1091[0...2]	**Skip frequency [Hz]**	0.00 - 550.00	0.00	U, T	-	DDS	Float	3
	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).							
Note:	The function is disabled if P1091 = 0.							
P1092[0...2]	**Skip frequency 2 [Hz]**	0.00 - 550.00	0.00	U, T	-	DDS	Float	3
	Defines skip frequency 2 which avoids effects of mechanical resonance and suppresses frequencies within +/-P1101 (skip frequency bandwidth).							
Note:	See P1091							
P1093[0...2]	**Skip frequency 3 [Hz]**	0.00 - 550.00	0.00	U, T	-	DDS	Float	3
	Defines skip frequency 3 which avoids effects of mechanical resonance and suppresses frequencies within +/-P1101 (skip frequency bandwidth).							
Note:	See P1091							
P1094[0...2]	**Skip frequency 4 [Hz]**	0.00 - 550.00	0.00	U, T	-	DDS	Float	3
	Defines skip frequency 4 which avoids effects of mechanical resonance and suppresses frequencies within +/-P1101 (skip frequency bandwidth).							
Note:	See P1091							
P1101[0...2]	**Skip frequency bandwidth [Hz]**	0.00 - 10.00	2.00	U, T	-	DDS	Float	3
	Delivers frequency bandwidth to be applied to skip frequencies.							
Note:	See P1091							
P1110[0...2]	**BI: Inhibit negative frequency setpoint**	0 - 4294967295	0	T	-	CDS	U32	3
	This parameter suppresses negative setpoints. Therefore, modification of the motor direction is inhibited to the set-point channel. If a minimum frequency (P1080) and a negative setpoint are given, the motor is accelerated by a positive value in relationship to the minimum frequency.							
Setting:	0	Disabled						
	1	Enabled						
P1113[0...2]	**BI: Reverse**	0 - 4294967295	19.11	T	-	CDS	U32	3
	Defines source of reverse command used when P0719 = 0 (Auto selection of command/setpoint source).							
Setting:	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)						

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
r1114	**CO: Freq. setpoint after direction control [Hz]**	-	-	-	-	-	Float	3
	Displays setpoint frequency after change of direction.							
r1119	**CO: Freq. setpoint before RFG [Hz]**	-	-	-	-	-	Float	3
	Displays frequency setpoint at the input to the ramp function generator after modification by other functions, e.g.: • P1110 BI: Inhibit neg. freq. setpoint, • P1091 - P1094 skip frequencies, • P1080 min. frequency, • P1082 max. frequency, This value is available filtered (r0020) and unfiltered (r1119).							
P1120[0...2]	**Ramp-up time [s]**	0.00 - 650.00	10.00	C, U, T	-	DDS	Float	1
	Time taken for motor to accelerate from standstill up to maximum motor frequency (P1082) when no rounding is used. Setting the ramp-up time too short can cause the converter to trip (overcurrent F1).							
Dependency:	Rounding times (P1130 - P1133), rounding type (P1134), and ramp-up time scaling factor (P1138) will also have influence on the ramp. See also P3350, P3353.							
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 Set ramp-up time = ramp-up time scaling factor (P1138) x ramp-up time (P1120).							
Note:	If an external frequency setpoint with set ramp rates is used (e.g. from a PLC), the best way to achieve optimum converter performance is to set ramp times in P1120 and P1121 slightly shorter than those of the PLC. Changes to P1120 will be immediately effective. If the SuperTorque function is enabled, the converter will initially ramp using the value in P3353.							
P1121[0...2]	**Ramp-down time [s]**	0.00 - 650.00	10.00	C, U, T	-	DDS	Float	1
	Time taken for motor to decelerate from maximum motor frequency (P1082) down to standstill when no rounding is used.							
Dependency:	Ramp-down time scaling factor (P1139) will also have influence on the ramp. See also P3350, P3353.							
Notice:	Setting the ramp-down time too short can cause the converter to trip (overcurrent F1/overvoltage F2). 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 Set ramp-down time = ramp-down time scaling factor (P1139) x ramp-down time (P1121).							
Note:	Changes to P1121 will be immediately effective. See P1120							
P1124[0...2]	**BI: Enable JOG ramp times**	0 - 4294967295	0	T	-	CDS	U32	3
	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.							
Dependency:	See also P1175.							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
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. If the Dual Ramp function is selected using P1175, ramp times will switch between normal (P1120, P1121) and JOG (P1060, P1061) ramp times, depending on the settings of P2150, P2157 and P2159. Therefore, it is not recommended that JOG ramp is selected at the same time as Dual Ramp. See P1120.							
P1130[0...2]	**Ramp-up initial rounding time [s]**	0.00 - 40.00	0.00	U, T	-	DDS	Float	2
	Defines rounding time in seconds at start of ramp-up.							
Notice:	Rounding times are recommended, since they prevent an abrupt response, thus avoiding detrimental effects on the mechanics. Rounding times are not recommended when analog inputs are used, since they would result in overshoot/undershoot in the converter response.							
Note:	If short or zero ramp times (P1120, P1121 < P1130, P1131, P1132, P1133) are set, the total ramp up time (t_up) or ramp down time (t_down) will not depend on P1130.							
P1131[0...2]	**Ramp-up final rounding time [s]**	0.00 - 40.00	0.00	U, T	-	DDS	Float	2
	Defines rounding time at end of ramp-up.							
Notice:	See P1130							
P1132[0...2]	**Ramp-down initial rounding time [s]**	0.00 - 40.00	0.00	U, T	-	DDS	Float	2
	Defines rounding time at start of ramp-down.							
Notice:	See P1130							
P1133[0...2]	**Ramp-down final rounding time [s]**	0.00 - 40.00	0.00	U, T	-	DDS	Float	2
	Defines rounding time at end of ramp-down.							
Notice:	See P1130							
P1134[0...2]	**Rounding type**	0 - 1	0	U, T	-	DDS	U16	2
	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.							
	0	Continuous smoothing						
	1	Discontinuous smoothing						
Dependency:	Effect only when P1130 (Ramp-up initial rounding time) or P1131 (Ramp-up final rounding time) or P1132 (Ramp-down initial rounding time) or P1133 (Ramp-down final rounding time) > 0 s.							
P1135[0...2]	**OFF3 ramp-down time [s]**	0.00 - 650.00	5.00	C, U, T	-	DDS	Float	2
	Defines ramp-down time from maximum frequency to standstill for OFF3 command. Settings in P1130 and P1134 will have no effect on OFF3 ramp-down characteristic. An initial ramp-down rounding time of approximately 10% of P1135 is however included. For the total OFF3 ramp-down time: t_down,OFF3 = f(P1134) = 1.1 * P1135 * (|f_2|/P1082)							
Note:	This time may be exceeded if the Vdc_max level is reached.							
P1138[0...2]	**Ramp-up time scaling factor**	1.00 - 10.00	1.00	C, U, T	-	DDS	Float	1
	Defines the scaling factor for the ramp-up time. This is a ramp-up time multiplier, extending the maximum ramp-up time to 6500 s. Set ramp-up time = ramp-up time scaling factor (P1138) x ramp-up time (P1120).							
Note:	This time may be exceeded if the Vdc_max level is reached.							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P1139[0...2]	**Ramp-down time scaling factor**	1.00 - 10.00	1.00	C, U, T	-	DDS	Float	1
	Defines the scaling factor for the ramp-down time. This is a ramp-down time multiplier, extending the maximum ramp-down time to 6500 s. Set ramp-down time = ramp-down time scaling factor (P1139) x ramp-down time (P1121).							
Note:	This time may be exceeded if the Vdc_max level is reached.							
P1140[0...2]	**BI: RFG enable**	0 - 4294967295	1	T	-	CDS	U32	3
	Defines command source of RFG enable command (RFG: ramp function generator). If binary input is equal to zero then the RFG output will be set immediately to 0.							
P1141[0...2]	**BI: RFG start**	0 - 4294967295	1	T	-	CDS	U32	3
	Defines command source of RFG start command (RFG: ramp function generator). If binary input is equal to zero then the RFG output is held at its present value.							
P1142[0...2]	**BI: RFG enable setpoint**	0 - 4294967295	1	T	-	CDS	U32	3
	Defines command source of RFG enable setpoint command (RFG: ramp function generator). If binary input is equal to zero, the RFG input will be set to zero and the RFG output will ramp-down to zero.							
r1170	**CO: Frequency setpoint after RFG [Hz]**	-	-	-	-	-	Float	3
	Displays overall frequency setpoint after ramp generator.							
P1175[0...2]	**BI: Dual ramp enable**	0 - 4294967295	0	T	-	CDS	U32	3
	Defines command source of dual ramp enable command. If binary input is equal to one, then the dual ramp will be applied. This works as follows: • Ramp-up: – Converter starts ramp-up using ramp time from P1120 – When f_act > P2157, switch to ramp time from P1060 • Ramp-down: – Converter starts ramp-down using ramp time from P1061 – When f_act < P2159, switch to ramp time from P1121							



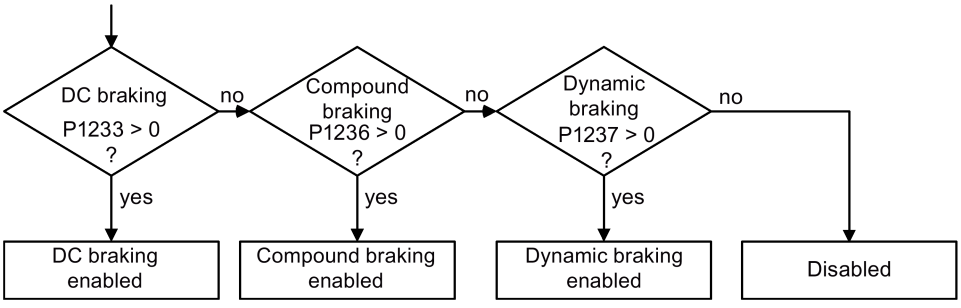
Parameter	Function		Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
Dependency:	See P2150, P2157, P2159, r2198.								
Note:	The dual ramp algorithm uses r2198 bits 1 and 2 to determine (f_act > P2157) and (f_act < P2159). P2150 is used to apply hysteresis to these settings, so the user may wish to change the value of this parameter to make the dual ramp function more responsive. It is not recommended that the dual ramp function is used in conjunction with JOG ramp. See P1124.								
r1199.7...12	**CO/BO: RFG status word**		-	-	-	-	-	U16	3
	Displays status of ramp function generator (RFG).								
	Bit	**Signal name**				**1 signal**		**0 signal**	
	07	Ramp #0 active				Yes		No	
	08	Ramp #1 active				Yes		No	
	09	Ramping finished				Yes		No	
	10	Direction right/left				Yes		No	
	11	f_act > P2157(f_2)				Yes		No	
	12	f_act < P2159(f_3)				Yes		No	
Note:	See P2157 and P2159.								
P1200	**Flying start**		0 - 6	0	U, T	-	-	U16	2
	Starts converter onto a rotating motor by rapidly changing the output frequency of the converter until the actual motor speed has been found. Then, the motor runs up to setpoint using the normal ramp time.								
	0		Flying start disabled						
	1		Flying start always active; searches in both directions						
	2		Flying start active after power on, fault, OFF2; searches in both directions						
	3		Flying start active after fault, OFF2; searches in both directions						
	4		Flying start always active; searches in direction of setpoint only						
	5		Flying start active after power on, fault, OFF2; searches in direction of setpoint only						
	6		Flying start active after fault, OFF2; searches in direction of setpoint only						
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.								
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.								
P1202[0...2]	**Motor-current: flying start [%]**		10 - 200	100	U, T	-	DDS	U16	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. However, search current settings in P1202 that are below 30% (and sometimes other settings in P1202 and P1203) may cause motor speed to be found prematurely or too late, which can result in F1 or F2 trips.								
P1203[0...2]	**Search rate: flying start [%]**		10 - 500	100	U, T	-	DDS	U16	3
	Sets factor (in V/f mode only) by which the output frequency changes during flying start to synchronize with turning motor. This value is entered in [%]. It defines the reciprocal initial gradient in the search sequence. P1203 influences the time taken to search for the motor frequency.								
Example:	For a motor with 50 Hz, 1350 rpm, 100 % would produce a maximum search time of 600 ms.								
Note:	A higher value produces a flatter gradient and thus a longer search time. A lower value has the opposite effect.								

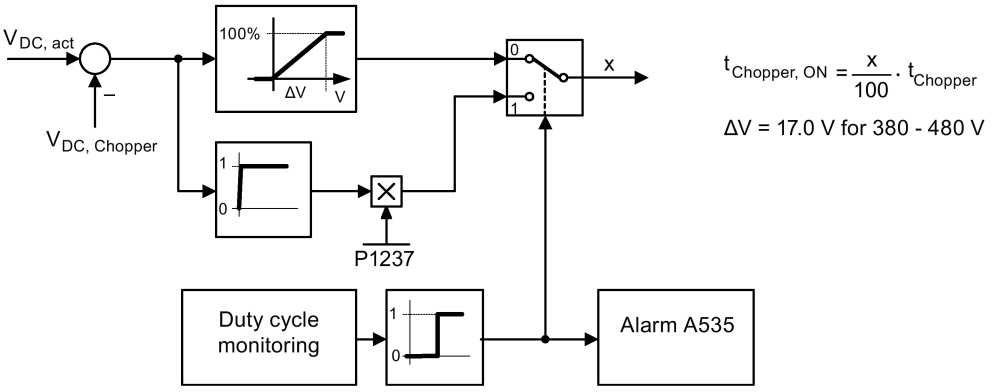
Parameter	Function		Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
r1204	**Status word: flying start V/f**		-	-	-	-	-	U16	4
	Bit parameter for checking and monitoring states during search.								
	Bit	**Signal name**				**1 signal**		**0 signal**	
	00	Current applied				Yes		No	
	01	Current could not be applied				Yes		No	
	02	Voltage reduced				Yes		No	
	03	Slope-filter started				Yes		No	
	04	Current less threshold				Yes		No	
	05	Current-minimum				Yes		No	
	07	Speed could not be found				Yes		No	
P1210	**Automatic restart**		0 - 11	1	U, T	-	-	U16	2
	Configures automatic restart function.								
	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 brownout/blackout or fault, P1211 enabled						
	7		Restart after mains brownout/blackout or fault, trip when P1211 expires						
	8		Restart after mains brownout/blackout with F3 and leave an interval in seconds determined by P1214, P1211 disabled						
	9		Restart after mains brownout/blackout with F3 during the attempt time determined by P1214, P1211 disabled						
	10		Restart after mains brownout/blackout with F3 during the attempt time determined by P1214 or manual fault acknowledgment, P1211 disabled						
	11		Trip reset at power on after mains brownout/blackout with F3 and if no ON command is active; P1211 disabled						
Dependency:	Automatic restart requires constant ON command via a digital input wire link.								
Caution:	Setting P1210 =2 ... 10 can cause the motor to restart automatically without toggling the ON command!								
Notice:	A "mains brownout" is a very short mains break, where the DC link has not fully collapsed before the power is reapplied. A "mains blackout" is a long mains break, where the DC link has fully collapsed before the power is re-applied. "Delay Time" is the time between attempts of quitting fault. The "Delay Time" of first attempt is 1 second, then it will be doubled every next attempt. The "Number of Restart Attempts" can be set in P1211. This is the number of restarts the converter will try to quit fault. When faults are quit and after 4 seconds of no fault condition, "Number of Restart Attempts" will be reset to P1211 and "Delay Time" will be reset to 1 second. P1210 = 0: Automatic restart is disabled. P1210 = 1: The converter will acknowledge (reset) faults i.e. it will reset a fault when the power is re-applied. This means the converter must be fully powered down, a brownout is not sufficed. The converter will not run until the ON command has been toggled.								

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
	P1210 = 2: The converter will acknowledge the fault F3 at power on after blackout and restarts. It is necessary that the ON command is wired via a digital input (digital input). P1210 = 3: For these settings it is fundamental that the converter only restarts if it has been in a RUN state at the time of the faults (F3, etc.). The converter will acknowledge the fault and restarts the converter after a brownout. It is necessary that the ON command is wired via a digital input (digital input). P1210 = 4: For these settings it is fundamental that the converter only restarts if it has been in a RUN state at the time of the fault (F3). The converter will acknowledge the fault and restarts the converter after a brownout. It is necessary that the ON command is wired via a digital input (digital input). P1210 = 5: The converter will acknowledge the faults F3 etc. at power on after blackout and restarts. It is necessary that the ON command is wired via a digital input (digital input).							
	P1210 = 6: The converter will acknowledge the faults (F3 etc.) at power on after blackout or brownout and restarts. It is necessary that the ON command is wired via a digital input (digital input). Setting 6 causes the motor to restart immediately. P1210 = 7: The converter will acknowledge the faults (F3 etc.) at power on after blackout or brownout and restarts. It is necessary that the ON command is wired via a digital input (digital input). Setting 7 causes the motor to restart immediately. The difference between this mode and Mode 6 is that the fault status bit (r0052.3) is not set until the number of restarts defined by P1211 have been exhausted. 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). P1210 = 8: The converter will acknowledge the fault (F3) at power on after blackout or brownout and restarts. It is necessary that the ON command is wired via a digital input (DI). Setting 8 causes the motor to restart immediately. The interval between restarts is determined by P1214. P1210 = 9: The converter will acknowledge the fault (F3) at power on after blackout or brownout and restarts. It is necessary that the ON command is wired via a digital input (DI). The interval between restarts is fixed at 0.5 s. P1214 sets the total restart attempt time. If an F3 occurs and cannot be acknowledged within the time set in P1214, the F3 will go permanent and must be acknowledged manually to restart the converter. P1210 = 10: • The converter will acknowledge the fault (F3) at power on after blackout or brownout and restarts. It is necessary that the ON command is wired via a digital input (DI). The interval between restarts is fixed at 1.0 s. P1214 sets the total restart attempt time, but it must be equal to or less than 8 s. If an F3 occurs and cannot be acknowledged within the time set in P1214, the F3 will go permanent and must be acknowledged manually to restart the converter. • If a fault (the converter cannot recover from F6, F51, F52, F85, F100, and F101) occurs, the fault must be acknowledged manually at power on after blackout or brownout and the converter restarts. It is necessary that the ON command is wired via a digital input (DI). 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). P1210 = 11: The converter will acknowledge the fault (F3) at power on after blackout or brownout. The fault F3 can be cleared only if there are no other active faults and there is no active ON command after power on.							

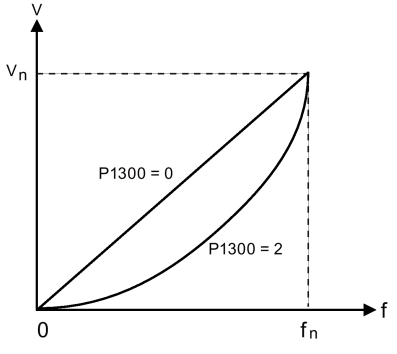
Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P1211	**Number of restart attempts**	0 - 10	3	U, T	-	-	U16	3
	Specifies number of times converter will attempt to restart if automatic restart P1210 is activated.							
P1214	**Restart time interval [s]**	0 - 1000	30	-	-	-	U16	3
	This parameter has either of the following functions: • Specifying the restart interval when P1210 = 8 • Specifying the total restart attempt time when P1210 = 9 or P1210 = 10							
P1215	**Holding brake enable**	0 - 3	0	C, T	-	-	U16	2
	Enables/disables holding brake function. The motor holding brake (MHB) is controlled via status word 1 r0052 bit 12. This signal can be issued via: • status word of the serial interface (e.g. USS) • digital outputs (e.g. DO1: ==> P0731 = 52.C (r0052 bit 12))							
	0	Motor holding brake disabled						
	1	Motor holding brake enabled at the frequency set in P1080						
	3	Motor holding brake enabled at the frequency set in P1219						
Note:	To make P1215=3 valid, make sure that the frequency value set in P1219 is less than the value set in P1080.							
Caution:	If the converter controls the motor holding brake, then a commissioning may not be carried out for potentially hazardous loads (e.g. suspended loads for crane applications) unless the load has been secured. It is not permissible to use the motor holding brake as working brake, as it is generally only designed for a limited number of emergency braking operations.							
P1216	**Holding brake release delay[s]**	0.0 - 20.0	1.0	C, T	-	-	Float	2
	Defines period during which the converter runs at the valid minimum frequency (P1080 or P1219) before ramping up.							
P1217	**Holding time after ramp down [s]**	0.0 - 20.0	1.0	C, T	-	-	Float	2
	Defines time for which the converter runs at the valid minimum frequency (P1080 or P1219) after ramping down.							
Note:	If P1217 > P1227, P1227 will take precedence.							
P1218[0...2]	**BI: Motor holding brake override**	0 - 4294967295	0	U, T	-	CDS	U32	3
	Enables the motor holding brake output to be overridden, allowing the brake to be opened under separate control.							
P1219[0...2]	**Minimum frequency for MHB [Hz]**	0.00 - 550.00	0.00	C, T	-	DDS	Float	1
	Sets the minimum motor frequency at which the motor holding brake (MHB) operates.							
Note:	This parameter is valid for the MHB only if P1215 = 3 and P1219 < P1080. If you set P1215 = 3 and inadvertently set P1219 > P1080, the minimum frequency used for the MHB is the value set in P1080. The value set here is valid for both clockwise and counterclockwise rotation. Under certain conditions (for example, ramping, current limiting), the motor can run below the minimum frequency.							
P1227[0...2]	**Zero speed detection monitoring time [s]**	0.0 - 300.0	4.0	U, T	-	DDS	Float	2
	Sets the monitoring time for the standstill identification. When braking with OFF1 or OFF3, standstill is identified after this time has expired, after the setpoint speed has fallen below P2167. After this, the braking signal is started, the system waits for the closing time and then the pulses are cancelled.							
Note:	P1227 = 300.0: function is deactivated P1227 = 0.0: pulses are locked immediately If P1217 > P1227, P1227 will take precedence.							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P1230[0...2]	**BI: Enable DC braking**	0 - 4294967295	0	U, T	-	CDS	U32	3
	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 converter output pulses are blocked and the DC current is not applied until the motor has been sufficiently demagnetized. This delay time is set in P0347 (demagnetization time). If this delay is too short, overcurrent trips can occur. 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.							
Caution:	With the DC braking, the kinetic energy of the motor is converted into heat in the motor. The converter could overheat if it remains in this status for an excessive period of time!							
P1232[0...2]	**DC braking current [%]**	0 - 250	100	U, T	-	DDS	U16	2
	Defines level of DC current relative to rated motor current (P0305). The DC braking can be issued observing the following dependencies: • OFF1/OFF3 ==> see P1233 • BICO ==> see P1230							
P1233[0...2]	**Duration of DC braking [s]**	0.00 - 250.00	0.00	U, T	-	DDS	Float	2
	Defines duration for which DC braking is active following an OFF1 or OFF3 command. When an OFF1 or OFF3 command is received by the converter, the output frequency starts to ramp to 0 Hz. When the output frequency reaches the value set in P1234, the converter injects a DC braking current P1232 for the time duration set in P1233.							
Caution:	See P1230							
Notice:	The DC braking function causes the motor to stop rapidly by applying a DC braking current. When the DC braking signal is applied, the converter 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).							
Note:	P1233 = 0 means that DC braking is not activated.							
P1234[0...2]	**DC braking start frequency [Hz]**	0.00 - 550.00	550.00	U, T	-	DDS	Float	2
	Sets start frequency for DC braking. When an OFF1 or OFF3 command is received by the converter, the output frequency starts to ramp to 0 Hz. When the output frequency reaches the value set in start frequency of DC braking P1234, the converter injects a DC braking current P1232 for the time duration set in P1233.							
P1236[0...2]	**Compound braking current [%]**	0 - 250	0	U, T	-	DDS	U16	2
	Defines DC level superimposed on AC waveform after exceeding DC-link voltage threshold of compound braking. The value is entered in [%] relative to rated motor current (P0305). Compound braking switch-on level (V_DC,Comp): If P1254 = 0 --> V_DC,Comp = 1.13 * sqrt(2) * V_mains = 1.13 * sqrt(2) * P0210 otherwise V_DC,Comp = 0.98 * 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.							
Dependency:	Compound braking depends on the DC link voltage only (see threshold above). This will happen on OFF1, OFF3 and any regenerative condition. It is disabled, when: • DC braking is active • Flying start is active							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
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 converter behavior when braking may be worsened particularly with high values of compound braking.							
Note:	P1236 = 0 means that compound braking is not activated.							
P1237	**Dynamic braking**	0 - 5	0	U, T	-	-	U16	2
	Dynamic braking absorbs the braking energy in a braking resistor. This parameter defines the rated duty cycle of the braking resistor. Dynamic braking is active when the function is enabled and DC-link voltage exceeds the dynamic braking switch-on level. Dynamic braking switch-on level (V_DC,Chopper) : If P1254 = 0 --> V_DC,Chopper = 1.13 * sqrt(2) * V_mains = 1.13 * sqrt(2) * P0210 otherwise V_DC,Chopper = 0.98 * r1242							
	0	Disabled						
	1	5 % duty cycle						
	2	10 % duty cycle						
	3	20 % duty cycle						
	4	50 % duty cycle						
	5	100 % duty cycle						
Note:	This parameter is only applicable for three phase AC 400 V converters. For single phase AC 230 V converters, the duty cycle of the braking resistor can be selected with the dynamic braking module (see Appendix "Dynamic braking module (Page 367)").							
Dependency:	If dynamic braking is used with DC braking enabled as well as compound braking, DC braking and compound braking will take priority. 							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
Notice:	Initially the brake will operate at a high duty cycle dependent on the DC link level until the thermal limit is approached. The duty cycle specified by this parameter will then be imposed. The resistor should be able to operate at this level indefinitely without overheating.  The threshold for the warning A535 is equivalent to 10 seconds running at 95 % duty cycle. The duty cycle will be limited when it was running 12 seconds at 95 % duty cycle.								
P1240[0...2]	**Configuration of Vdc controller**	0 - 3	1	C, T	-	DDS	U16	3
	Enables/disables Vdc controller. The Vdc controller dynamically controls the DC link voltage to prevent overvoltage trips on high inertia systems.							
	0	Vdc controller disabled						
	1	Vdc_max controller enabled						
	2	Kinetic buffering (Vdc_min controller) enabled						
	3	Vdc_max controller and kinetic buffering (KIB) enabled						
Caution:	If P1245 increased too much, it may interfere with the converter normal operation.							
Note:	• Vdc_max controller: Vdc_max controller automatically increases ramp-down times to keep the DC-link voltage (r0026) within limits (r1242). • Vdc_min controller: Vdc_min is activated if DC-link voltage falls below the switch on level P1245. The kinetic energy of the motor is then used to buffer the DC-link voltage, thus causing deceleration of the converter. If the converter trips with F3 immediately, try increasing the dynamic factor P1247 first. If still tripping with F3 try then increasing the switch on level P1245.							
r1242	**CO: Switch-on level of Vdc_max [V]**	-	-	-	-	-	Float	3
	Displays switch-on level of Vdc_max controller. Following equation is only valid, if P1254 = 0: r1242 = 1.15 * sqrt(2) * V_mains = 1.15 * sqrt(2) * P0210 otherwise r1242 is internally calculated.							
P1243[0...2]	**Dynamic factor of Vdc_max [%]**	10 - 200	100	U, T	-	DDS	U16	3
	Defines dynamic factor for DC link controller.							
Dependency:	P1243 = 100 % means 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 converter data.							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P1245[0...2]	**Switch on level kinetic buffering [%]**	65 - 95	76	U, T	-	DDS	U16	3
	Enter switch-on level for kinetic buffering (KIB) in [%] relative to supply voltage (P0210). r1246[V] = (P1245[%]/100) * sqrt(2) * P0210							
Warning:	Increasing the value too much, may interfere with the converter normal operation.							
Note:	P1254 has no effect on the switch-on-level for kinetic buffering. P1245 default for the single phase variants is 74%.							
r1246[0...2]	**CO: Switch-on level kinetic buffering [V]**	-	-	-	-	DDS	Float	3
	Displays switch-on level of kinetic buffering (KIB, Vdc_min controller). If the dc-link voltage drops below the value in r1246, kinetic buffering will be activated. That means the motor frequency will be reduced in order to keep Vdc within the valid range. If there is not enough regenerative energy, the converter trips with undervoltage.							
P1247[0...2]	**Dynamic factor of kinetic buffering [%]**	10 - 200	100	U, T	-	DDS	U16	3
	Enters dynamic factor for kinetic buffering (KIB, Vdc_min controller). P1247 = 100 % means P1250, P1251 and P1252 (gain, integration time and differential time) are used as set. Otherwise, these are multiplied by P1247 (dynamic factor of Vdc_min).							
Note:	Vdc controller adjustment is calculated automatically from motor and converter data.							
P1250[0...2]	**Gain of Vdc controller**	0.00 - 10.00	1.00	U, T	-	DDS	Float	3
	Enters gain for Vdc controller.							
P1251[0...2]	**Integration time Vdc controller [ms]**	0.1 - 1000.0	40.0	U, T	-	DDS	Float	3
	Enters integral time constant for Vdc controller.							
P1252[0...2]	**Differential time Vdc controller [ms]**	0.0 - 1000.0	1.0	U, T	-	DDS	Float	3
	Enters differential time constant for Vdc controller.							
P1253[0...2]	**Vdc controller output limitation [Hz]**	0.00 - 550.00	10.00	U, T	-	DDS	Float	3
	Limits maximum effect of Vdc_max controller.							
Dependency:	This parameter is influenced by automatic calculations defined by P0340.							
Note:	The Factory setting depends on converter power.							
P1254	**Auto detect Vdc switch-on levels**	0 - 1	1	C, T	-	-	U16	3
	Enables/disables auto-detection of switch-on levels for Vdc_max controller. For best results, it is recommended to set P1254 = 1 (auto-detection of Vdc switch-on levels enabled). Setting P1254 = 0 is only recommended when there is a high degree of fluctuation of the DC-link when the motor is being driven. Note that the auto detection only works when the converter has been in standby for over 20s.							
	0	Disabled						
	1	Enabled						
Dependency:	See P0210							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P1256[0...2]	**Reaction of kinetic buffering**	0 - 2	0	C, T	-	DDS	U16	3
	Enters reaction for kinetic buffering controller (Vdc_min controller). Depending on the setting selected, the frequency limit defined in P1257 is used to either hold the speed or disable pulses. If not enough regeneration is produced, converter may trip with undervoltage.							
	0	Maintain DC-link until trip						
	1	Maintain DC-link until trip/stop						
	2	Control stop						
Note:	P1256 = 0: Maintain DC-link voltage until mains is returned or converter is tripped with undervoltage. The frequency is kept above the frequency limit provided in P1257. P1256 = 1: Maintain DC-link voltage until mains is returned or converter is tripped with undervoltage or pulses are disabled when frequency falls below the limit in P1257. P1256 = 2: This option ramps down the frequency to standstill even when mains return. If mains do not return, frequency brought down under the control of Vdc_min controller until P1257 limit. Then pulses are disabled or undervoltage has occurred. If mains return, then an OFF1 is active until P1257 limit. Then pulses are disabled.							
P1257[0...2]	**Frequency limit for kinetic buffering [Hz]**	0.00 - 550.00	2.50	U, T	-	DDS	Float	3
	Frequency which kinetic buffering (KIB) either hold speed or disable pulses depending on P1256.							
P1300[0...2]	**Control mode**	0 - 19	0	C, T	-	DDS	U16	2
	Parameter to select the control method. Controls relationship between speed of motor and voltage supplied by converter.							
	0	V/f with linear characteristic						
	1	V/f with FCC						
	2	V/f with quadratic characteristic						
	3	V/f with programmable characteristic						
	4	V/f with linear eco						
	5	V/f for textile applications						
	6	V/f with FCC for textile applications						
	7	V/f with quadratic eco						
	19	V/f control with independent voltage setpoint						
								

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level

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)

P1300 = 4: V/f with linear characteristic and Economy Mode

- Linear characteristic with Economy Mode
- Modifies the output voltage to reduce power consumption

P1300 = 5,6: V/f for textile applications

- Slip compensation disabled.
- Imax controller modifies the output voltage only.
- Imax controller does not influence the output frequency.

P1300 = 7: V/f with quadratic characteristic and Economy Mode

- Quadratic characteristic with Economy Mode
- Modifies the output voltage to reduce power consumption

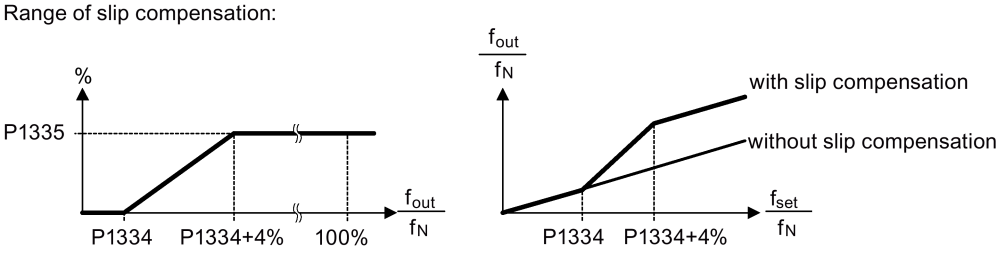
P1300 = 19: V/f control with independent voltage setpoint

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

Par No.	Parameter name	Level	V/f						
			P1300 =						
			0	1	2	3	5	6	19
P1300[3]	Control mode	2	x	x	x	x	x	x	x
P1310[3]	Continuous boost	2	x	x	x	x	x	x	x
P1311[3]	Acceleration boost	2	x	x	x	x	x	x	x
P1312[3]	Starting boost	2	x	x	x	x	x	x	x
P1316[3]	Boost end frequency	3	x	x	x	x	x	x	x
P1320[3]	Programmable V/f freq. coord. 1	3	–	–	–	x	–	–	–
P1321[3]	Programmable V/f volt. coord. 1	3	–	–	–	x	–	–	–
P1322[3]	Programmable V/f freq. coord. 2	3	–	–	–	x	–	–	–
P1323[3]	Programmable V/f volt. coord. 2	3	–	–	–	x	–	–	–
P1324[3]	Programmable V/f freq. coord. 3	3	–	–	–	x	–	–	–
P1325[3]	Programmable V/f volt. coord. 3	3	–	–	–	x	–	–	–
P1330[3]	CI: Voltage setpoint	3	–	–	–	–	–	–	x
P1333[3]	Start frequency for FCC	3	–	x	–	–	–	x	–
P1335[3]	Slip compensation	2	x	x	x	x	–	–	–
P1336[3]	CO: Slip limit	2	x	x	x	x	–	–	–
P1338[3]	Resonance damping gain V/f	3	x	x	x	x	–	–	–
P1340[3]	Imax freq. controller prop. gain	3	x	x	x	x	x	x	x
P1341[3]	Imax controller integral time	3	x	x	x	x	x	x	x
P1345[3]	Imax controller prop. gain	3	x	x	x	x	x	x	x
P1346[3]	Imax voltage ctrl. integral time	3	x	x	x	x	x	x	x
P1350[3]	Voltage soft start	3	x	x	x	x	x	x	x

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P1310[0...2]	**Continuous boost [%]**	0.0 - 250.0	50.0	U, T	PERCENT	DDS	Float	2
	Defines boost level in [%] relative to P0305 (rated motor current) applicable to both linear and quadratic V/f curves. At low output frequencies the output voltage is low to keep the flux level constant. However, the output voltage may be too low for the following: • magnetization the asynchronous motor • hold the load • overcome losses in the system. The converter output voltage can be increased via P1310 for the compensation of losses, holding loads at 0 Hz, or maintaining the magnetization. The magnitude of the boost in Volt at a frequency of zero is defined as follows: V_ConBoost,100 = P0305 * Rsadj * (P1310/100) Where: Rsadj = stator resistance adjusted for temperature Rsadj = (r0395/100) * (P0304/(sqrt(3) * P0305)) * P0305 * sqrt(3)							
Note:	Increasing the boost levels increases motor heating (especially at standstill). Setting in P0640 (motor overload factor [%]) limits the boost: sum(V_Boost)/(P0305 * Rsadj) <= P1310/100 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) <= 3 * R_S * I_Mot = 3 * P0305 * Rsadj							
P1311[0...2]	**Acceleration boost [%]**	0.0 - 250.0	0.0	U, T	PERCENT	DDS	Float	2
	Applies boost in [%] relative to P0305 (rated motor current) following a positive setpoint change and drops back out once the setpoint is reached. P1311 will only produce boost during ramping, and is therefore useful for additional torque during acceleration and deceleration. As opposed to P1312, which is only active on the first acceleration issued after the ON command, P1311 is always effect during an acceleration and deceleration when issued. The magnitude of the boost in volt at a frequency of zero is defined as follows: V_AccBoost,100 = P0305 * Rsadj * (P1311/100) Where: Rsadj = stator resistance adjusted for temperature Rsadj = (r0395/100) * (P0304/(sqrt(3) * P0305)) * P0305 * sqrt(3)							
Note:	See P1310							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P1312[0...2]	**Starting boost [%]**	0.0 - 250.0	0.0	U, T	PERCENT	DDS	Float	2
	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 converter to limit the current, which will in turn restrict the output frequency to below the setpoint frequency. The magnitude of the boost in volt at a frequency of zero is defined as follows: V_StartBoost,100 = P0305 * Rsadj * (P1312/100) Where: Rsadj = stator resistance adjusted for temperature Rsadj = (r0395/100) * (P0304/(sqrt(3) * P0305)) * P0305 * sqrt(3)							
Note:	See P1310							
r1315	**CO: Total boost voltage [V]**	-	-	-	-	-	Float	4
	Displays total value of voltage boost.							
P1316[0...2]	**Boost end frequency [%]**	0.0 - 100.0	20.0	U, T	PERCENT	DDS	Float	3
	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: V_Boost,min = 2 * (3 + (153/sqrt(P_Motor))							
Dependency:	This parameter is influenced by automatic calculations defined by P0340.							
Note:	The expert user may change this value to alter the shape of the curve, e.g. to increase torque at a particular frequency. Default value is depending on converter type and its rating data.							
P1320[0...2]	**Programmable V/f freq. coord. 1 [Hz]**	0.00 - 550.00	0.00	T	-	DDS	Float	3
	Sets the frequency of the first point of V/f coordinates (P1320/1321 to P1324/1325) to define V/f characteristic. These parameter pairs can be used to provide correct torque at correct frequency.							
Dependency:	To set parameter, select P1300 = 3 (V/f with programmable characteristic). The acceleration boost and starting boost defined in P1311 and P1312 are applied to 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 and 2 non-programmable points. The 2 non-programmable points are: • Continuous boost P1310 at 0 Hz • Rated motor voltage P0304 at rated motor frequency P0310							
P1321[0...2]	**Programmable V/f volt. coord. 1 [V]**	0.0 - 3000.0	0.0	U, T	-	DDS	Float	3
	See P1320							
P1322[0...2]	**Programmable V/f freq. coord. 2 [Hz]**	0.00 - 550.00	0.00	T	-	DDS	Float	3
	See P1320							
P1323[0...2]	**Programmable V/f volt. coord. 2 [V]**	0.0 - 3000.0	0.0	U, T	-	DDS	Float	3
	See P1320							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P1324[0...2]	**Programmable V/f freq. coord. 3 [Hz]**	0.00 - 550.00	0.00	T	-	DDS	Float	3
	See P1320							
P1325[0...2]	**Programmable V/f volt. coord. 3 [V]**	0.0 - 3000.0	0.0	U, T	-	DDS	Float	3
	See P1320							
P1330[0...2]	**CI: Voltage setpoint**	0 - 4294967295	0	T	-	CDS	U32	3
	BICO parameter for selecting source of voltage setpoint for independent V/f control (P1300 = 19).							
P1333[0...2]	**Start frequency for FCC [%]**	0.0 - 100.0	10.0	U, T	PERCENT	DDS	Float	3
	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.							
P1334[0...2]	**Slip compensation activation range [%]**	1.0 - 20.0	6.0	U, T	PERCENT	DDS	Float	3
	To set the frequency activation range for slip compensation. The percentage value of P1334 refers to the motor rated frequency P0310. The upper threshold will always stay 4 % above P1334. Range of slip compensation:  							
Dependency:	Slip compensation (P1335) active.							
Note:	See P1335. The starting frequency of the slip compensation is P1334 * P0310.							
P1335[0...2]	**Slip compensation [%]**	0.0 - 600.0	0.0	U, T	PERCENT	DDS	Float	2
	Parameter dynamically adjusts converter output frequency so that motor speed is kept constant independent of motor load. In the V/f-control, the motor frequency will always be less than the converter output frequency due to the slip frequency. For a given output frequency, the motor frequency will drop as load is increased. This behavior, typical for induction motors, can be compensated using slip compensation. P1335 can be used to enable and fine-tune the slip compensation.							
Dependency:	Gain adjustment enables fine-tuning of the actual motor speed. P1335 > 0, P1336 > 0, P1337 = 0 if P1300 = 5, 6.							
Notice:	The applied value of the slip compensation (scaled by P1335) is limited by following equation: f_Slip_comp,max = r0330 * (P1336/100)							
Note:	P1335 = 0 %: Slip compensation disabled. P1335 = 50 % - 70 %: Full slip compensation at cold motor (partial load). P1335 = 100 % (standard setting for warm stator): Full slip compensation at warm motor (full load).							

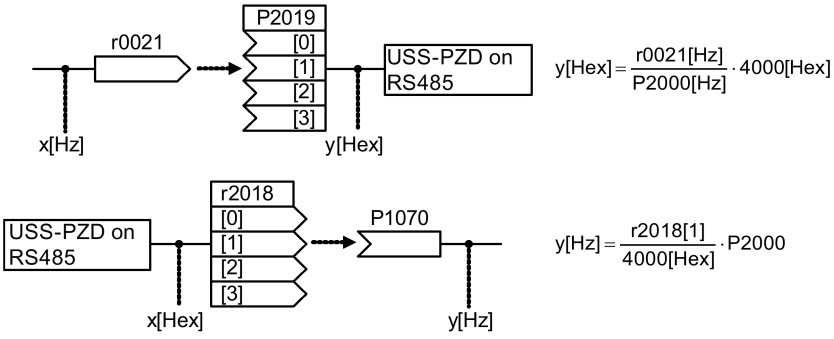
Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P1336[0...2]	**Slip limit [%]**	0 - 600	250	U, T	-	DDS	U16	2
	Compensation slip limit in [%] relative to r0330 (rated motor slip), which is added to frequency setpoint.							
Dependency:	Slip compensation (P1335) active.							
r1337	**CO: V/f slip frequency [%]**	-	-	-	PERCENT	-	Float	3
	Displays actual compensated motor slip as [%]. f_slip [Hz] = r1337 [%] * P0310/100							
Dependency:	Slip compensation (P1335) active.							
P1338[0...2]	**Resonance damping gain V/f**	0.00 - 10.00	0.00	U, T	-	DDS	Float	3
	Defines resonance damping gain for V/f. The di/dt of the active current will be scaled by P1338. If di/dt increases the resonance damping circuit decreases the converter output frequency.							
Dependency:	This parameter is influenced by automatic calculations defined by P0340.							
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[0...2]	**Imax controller proportional gain**	0.000 - 0.499	0.030	U, T	-	DDS	Float	3
	Proportional gain of the I_max controller. The Imax controller reduces converter current if the output current exceeds the maximum motor current (r0067). In linear V/f, parabolic V/f, FCC, and programmable V/f modes the I_max controller uses both a frequency controller (see P1340 and P1341) and a voltage controller (see P1345 and P1346). The frequency controller seeks to reduce current by limiting the converter output frequency (to a minimum of the two times nominal slip frequency). If this action does not successfully remove the overcurrent condition, the converter output voltage is reduced using the I_max voltage controller. When the overcurrent condition has been removed successfully, frequency limiting is removed using the ramp-up time set in P1120. In linear V/f for textiles, FCC for textiles, or external V/f modes only the I_max voltage controller is used to reduce current (see P1345 and P1346).							
Note:	The I_max controller can be disabled by setting the frequency controller integral time P1341 to zero. This disables both the frequency and voltage controllers. Note that when disabled, the I_max controller will take no action to reduce current but overcurrent warnings will still be generated, and the converter will trip in excessive overcurrent or overload conditions.							
P1341[0...2]	**Imax controller integral time [s]**	0.000 - 50.000	0.300	U, T	-	DDS	Float	3
	Integral time constant of the I_max controller. • P1341 = 0: I_max controller disabled • P1340 = 0 and P1341 > 0: frequency controller enhanced integral • P1340 > 0 and P1341 > 0: frequency controller normal PI control							
Dependency:	This parameter is influenced by automatic calculations defined by P0340.							
Note:	See P1340 for further information. The Factory setting depends on converter power.							

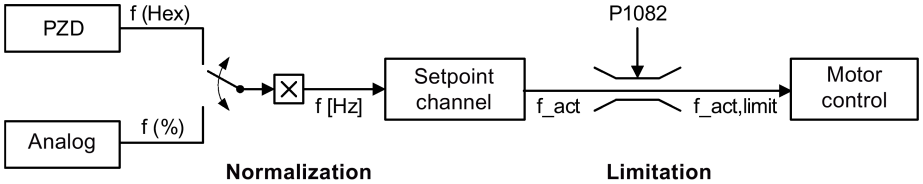
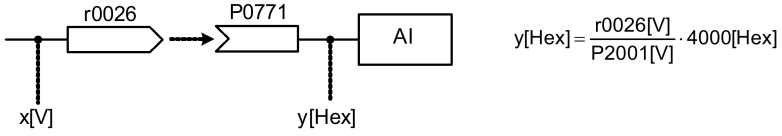
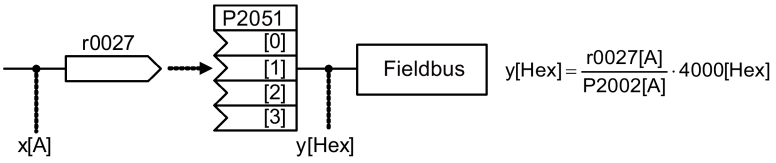
Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
r1343	**CO: Imax controller frequency output [Hz]**	-	-	-	-	-	Float	3
	Displays effective frequency limitation.							
Dependency:	If I_max controller not in operation, parameter normally shows maximum frequency P1082.							
r1344	**CO: Imax controller voltage output [V]**	-	-	-	-	-	Float	3
	Displays amount by which the I_max controller is reducing the converter output voltage.							
P1345[0...2]	**Imax voltage controller proportional gain**	0.000 - 5.499	0.250	U, T	-	DDS	Float	3
	If the output current (r0068) exceeds the maximum current (r0067), the converter is dynamically controlled by reducing the output voltage. This parameter sets the proportional gain of this controller.							
Dependency:	This parameter is influenced by automatic calculations defined by P0340.							
Note:	See P1340 for further information. The Factory setting depends on converter power.							
P1346[0...2]	**Imax voltage controller integral time [s]**	0.000 - 50.000	0.300	U, T	-	DDS	Float	3
	Integral time constant of the I_max voltage controller. • P1341 = 0: I_max controller disabled • P1345 = 0 and P1346 > 0: I_max voltage controller enhanced integral • P1345 > 0 and P1346 > 0: I_max voltage controller normal PI control							
Dependency:	This parameter is influenced by automatic calculations defined by P0340.							
Note:	See P1340 for further information. The Factory setting depends on converter power.							
r1348	**Economy mode factor [%]**	-	-	-	PERCENT	-	Float	2
	Displays the calculated economy mode factor (range 80%-120%) applied to the demanded output volts. Economy mode is used to find the most efficient operating point for a given load. It does this by a continuous method of hill climbing optimization. Hill climbing optimization works by slightly changing the output volts either up or down and monitoring the change in input power. If the input power has decreased, the algorithm changes the output volts in the same direction. If the input power has increased then the algorithm adjusts the output volts in the other direction. Using this algorithm, the software should be able to find the minimum point on the graph between input power and output volts.							
Notice:	If this value is too low, the system may become unstable.							
P1350[0...2]	**Voltage soft start**	0 - 1	0	U, T	-	DDS	U16	3
	Sets whether voltage is built up smoothly during magnetization time (ON) or whether it simply jumps to boost voltage (OFF).							
	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							

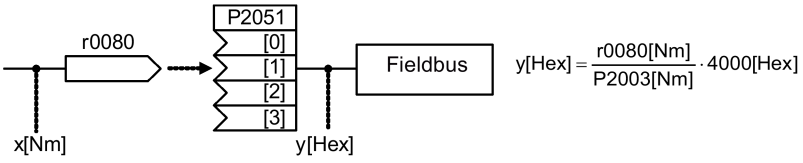
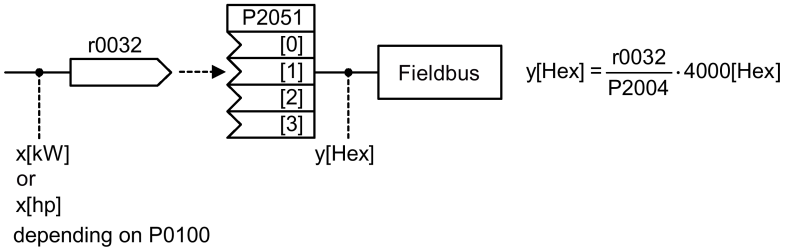
Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P1780[0...2]	**Control word of Rs/Rr-adaption**	0 - 1	1	U, T	-	DDS	U16	3
	Enables thermal adaptation of stator and rotor resistance to reduce torque errors in speed/torque regulation with speed sensor, or speed errors in speed/torque regulation without speed sensor.							
	Bit	**Signal name**			**1 signal**		**0 signal**	
	00	Enable thermal Rs/Rr-adapt.			Yes		No	
P1800[0...2]	**Pulse frequency [kHz]**	2 - 16	4	U, T	-	DDS	U16	2
	Sets pulse frequency of power switches in converter. The frequency can be changed in steps of 2 kHz.							
Dependency:	The minimum/maximum/default values of the pulse frequency are determined by the used power module. Furthermore the minimum pulse frequency depends on the parameterization of P1082 (maximum frequency) and P0310 (rated motor frequency).							
Note:	If the pulse frequency is increased, maximum converter current r0209 can be reduced (derating). The derating characteristic depends on the type and power of the converter. If silent operation is not absolutely necessary, lower pulse frequencies may be selected to reduce converter losses and radio-frequency emissions. Under certain circumstances, the converter may reduce the pulse frequency to provide protection against overtemperature (see P0290 and P0291 bit 00).							
r1801[0...1]	**CO: Pulse frequency [kHz]**	-	-	-	-	-	U16	3
	Displays information about pulse frequency of power switches in converter. r1801[0] displays the actual converter pulse frequency. r1801[1] displays the minimum converter pulse frequency which can be reached when the functions "motor identification" or "converter overload reaction" are active. If no PM is plugged this parameter is set to 0 kHz.							
Index:	[0]	Actual pulse frequency						
	[1]	Minimum pulse frequency						
Notice:	Under certain conditions (converter overtemperature, see P0290), this can differ from the values selected in P1800 (pulse frequency).							
P1802	**Modulator mode**	1 - 3	3	U, T	-	-	U16	3
	Selects converter modulator mode.							
	1	Asymmetric SVM						
	2	Space vector modulation						
	3	SVM/ASVM controlled mode						
Notice:	• Asymmetric space vector modulation (ASVM) produces lower switching losses than space vector modulation (SVM), but may cause irregular rotation at very low speeds. • Space vector modulation (SVM) with over-modulation may produce current waveform distortion at high output voltages. • Space vector modulation (SVM) without over-modulation will reduce maximum output voltage available to motor.							
P1803[0...2]	**Maximum modulation [%]**	20.0 - 150.0	106.0	U, T	-	DDS	Float	3
	Sets maximum modulation index.							
Note:	P1803 = 100 %: Limit for over-control (for ideal converter without switching delay).							

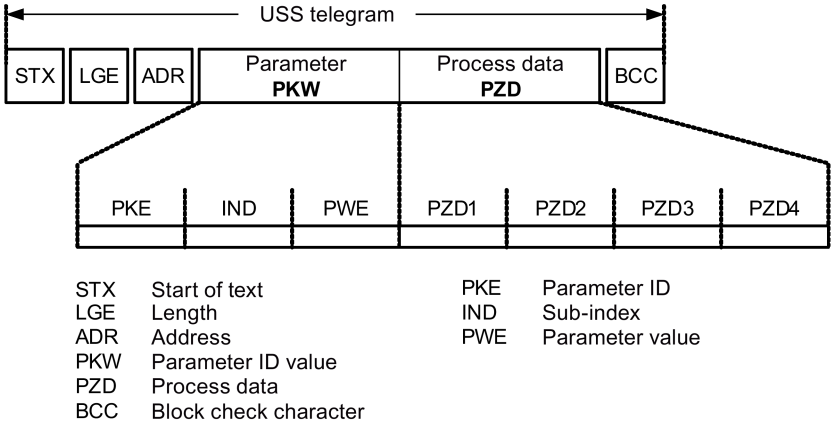
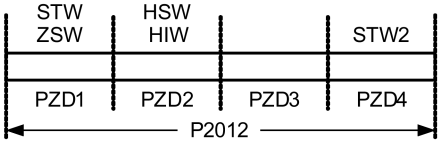
Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P1810	**Control word Vdc control**	0 - 3	3	U, T	-	-	U16	3
	Configures Vdc filtering and compensation.							
	Bit	**Signal name**			**1 signal**		**0 signal**	
	00	Enable Vdc average filter			Yes		No	
	01	Enable Vdc compensation			Yes		No	
Note:	P1810 default for the single phase variants is 2.							
P1820[0...2]	**Reverse output phase sequence**	0 - 1	0	T	-	DDS	U16	2
	Changes sequence of phases without changing setpoint polarity.							
	0	Forward						
	1	Reverse the Motor						
Note:	See P1000							
P1825	**On-state voltage of IGBT [V]**	0.0 - 20.0	0.9	U, T	-	-	Float	4
	Corrects on-state voltage of the IGBTs.							
P1828	**Gating unit dead time [µs]**	0.00 - 3.98	0.01	U, T	-	-	Float	4
	Sets compensation time of gating unit interlock.							
P1829	**Phase angle where output frequency crossing zero [°]**	0.0 – 180.0	0.0	U, T	-	-	Float	4
	Adjusts the phase angle at the point where the output frequency crosses zero. The angle is only used if the output frequency changes direction.							
P1900	**Select motor data identification**	0 - 2	0	C, T	-	-	U16	2
	Performs motor data identification.							
	0	Disabled						
	2	Identification of all parameters in standstill						
Dependency:	No measurement if motor data incorrect. P1900 = 2: Calculated value for stator resistance (see P0350) is overwritten.							
Notice:	When the identification is finished P1900 is set to 0. When choosing the setting for measurement, observe the following: 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. Ensure that the motor holding brake is not active when performing the motor identification.							
Note:	Before selecting motor data identification, "Quick commissioning" has to be performed in advance. Since the cable length of the applications differs in a wide range, the preset resistor P0352 is only a rough estimation. Better results of the motor identification can be achieved by specifying the cable resistor before the start of the motor identification by measuring/calculating. Once enabled (P1900 > 0), A541 generates a warning that the next ON command will initiate measurement of motor parameters. Communications - both via USS as well as via the Modbus - are interrupted for the time that it takes to make internal calculations. These calculations can take up to one minute to complete.							
P1909[0...2]	**Control word of motor data identification**	0 - 65519	23552	U, T	-	DDS	U16	4
	Control word of motor data identification.							
	Bit	**Signal name**			**1 signal**		**0 signal**	
	00	Estimation of Xs			Yes		No	

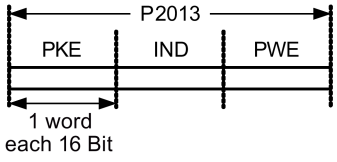
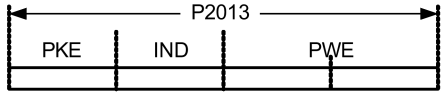
Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
	01 Motor ID at 2 kHz				Yes		No	
	02 Estimation of Tr				Yes		No	
	03 Estimation of Lsigma				Yes		No	
	05 Det. Tr meas. with 2 freq.				Yes		No	
	06 Measurement of on voltage				Yes		No	
	07 Deadtime detection from Rs measurement				Yes		No	
	08 MotID with hw deadtime comp activ				Yes		No	
	09 No deadtime detection with 2 freq				Yes		No	
	10 Detect Ls with LsBlock method				Yes		No	
	11 MotID adaption of magnetizing current				Yes		No	
	12 MotID adaption of main reactance				Yes		No	
	13 MotID switch off saturation curve optim.				Yes		No	
	14 MotID saturation curve optim. all framesizes				Yes		No	
	15 MotID saturation curve optim. big framesizes				Yes		No	
P1910	**Select motor data identification**	0 - 23	0	T	-	-	U16	4
	Performs a motor data identification with extended figures. Performs stator resistance measuring.							
	0	Disabled						
	1	Identification of all parameters with parameter change						
	2	Identification of all parameters without parameter change						
	3	Identification of saturation curve with parameter change						
	4	Identification of saturation curve without parameter change						
	5	Identification of XsigDyn without parameter change						
	6	Identification of Tdead without parameter change						
	7	Identification of Rs without parameter change						
	8	Identification of Xs without parameter change						
	9	Identification of Tr without parameter change						
	10	Identification of Xsigma without parameter change						
	20	Set voltage vector						
	21	Set voltage vector without filtering in r0069						
	22	Set voltage vector rectangle signal						
	23	Set voltage vector triangle signal						
Notice:	Ensure that the motor holding brake is not active when performing the motor identification. P1910 can't be changed while the motor identification with P1900 is active (P1900 = 2 or 3). When the identification is finished P1910 is set to 0. When choosing the setting for measurement, observe the following: • "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. • "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.							
Dependency:	No measurement if motor data incorrect. P1910 = 1: Calculated value for stator resistance (see P0350) is overwritten.							
Note:	See P1900							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
r1912[0]	**Identified stator resistance [Ω]**	-	-	-	-	-	Float	4
	Displays measured stator resistance value (line-to-line). This value also includes the cable resistances.							
Index:	[0]	U_phase						
Notice:	If the value identified (Rs = stator resistance) does not lie within the range 0.1 % < Rs [p. u.] < 100 % fault message 41 (motor data identification failure) is issued. P0949 provides further information (fault value = 2 in this case).							
Note:	This value is measured using P1900 = 2.							
r1920[0]	**Identified dynamic leakage inductance**	-	-	-	-	-	Float	4
	Displays identified total dynamic leakage inductance.							
Index:	[0]	U_phase						
r1925[0]	**Identified on-state voltage [V]**	-	-	-	-	-	Float	4
	Displays identified on-state voltage of IGBT.							
Index:	[0]	U_phase						
Notice:	If the identified on-state voltage does not lie within the range 0.0V < 10V fault message 41 (motor data identification failure) is issued. P0949 provides further information (fault value = 20 in this case).							
r1926	**Identified gating unit dead time [µs]**	-	-	-	-	-	Float	2
	Displays identified dead time of gating unit interlock.							
P2000[0...2]	**Reference frequency [Hz]**	1.00 - 550.00	50.00	T	-	DDS	Float	2
	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.: analog input)							
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. SINAMICS implicitly makes an automatic conversion to the target value. 							
Dependency:	When Quick Commissioning is carried out, P2000 is changed as follows: P2000 = P1082.							

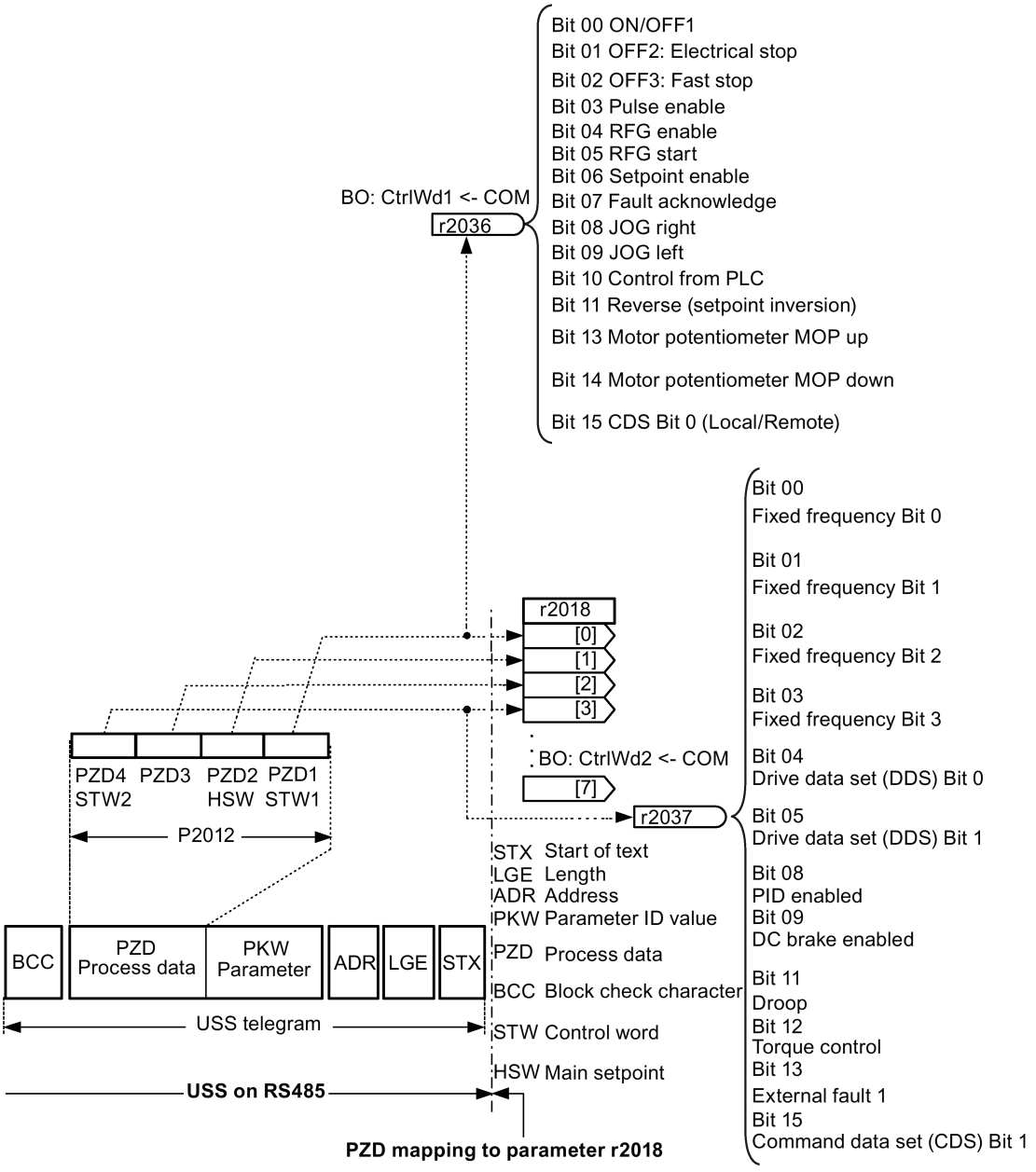
Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
Caution:	P2000 represents the reference frequency of the above mentioned interfaces. A maximum frequency setpoint of 2*P2000 can be applied via the corresponding interface. Unlike P1082 (Maximum Frequency) this limits the converter 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 parameters are intended as an aid to presenting setpoint and actual value signals in a uniform manner. This also applies to fixed settings entered as a percentage. A value of 100 % corresponds to a process data value of 4000H, or 4000 0000H in the case of double values. In this respect, the following parameters are available: P2000 Reference frequency — Hz P2001 Reference voltage — V P2002 Reference current — A P2003 Reference torque — Nm P2004 Reference power — kW / hp — f(P0100)							
Note:	Changes to P2000 result in a new calculation of P2004.							
P2001[0...2]	**Reference voltage [V]**	10 - 2000	1000	T	-	DDS	U16	3
	Full-scale output voltage (i.e. 100 %) used over serial link (corresponds to 4000H).							
Example:	 $y[Hex] = \frac{r0026[V]}{P2001[V]} \cdot 4000[Hex]$							
Note:	Changes to P2001 result in a new calculation of P2004.							
P2002[0...2]	**Reference current [A]**	0.10 - 10000.0	0.10	T	-	DDS	Float	3
	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. In this case an automatic conversion to the target value is made.  $y[Hex] = \frac{r0027[A]}{P2002[A]} \cdot 4000[Hex]$							
Dependency:	This parameter is influenced by automatic calculations defined by P0340.							
Note:	Changes to P2002 result in a new calculation of P2004.							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P2003[0...2]	**Reference torque [Nm]**	0.10 - 99999.0	0.75	T	-	DDS	Float	3
	Full-scale reference torque used over the 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. Nm) values) may differ. In this case an automatic conversion to the target value is made. 							
Dependency:	This parameter is influenced by automatic calculations defined by P0340.							
Note:	Changes to P2003 result in a new calculation of P2004.							
P2004[0...2]	**Reference power**	0.01 - 2000.0	0.75	T	-	DDS	Float	3
	Full-scale reference power used over the 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. kW/hp) values) may differ. In this case an automatic conversion to the target value is made. 							
P2010[0...1]	**USS/MODBUS baudrate**	6 - 12	6	U, T	-	-	U16	2
	Sets baud rate for USS/MODBUS communication.							
	6	9600 bps						
	7	19200 bps						
	8	38400 bps						
	9	57600 bps						
	10	76800 bps						
	11	93750 bps						
	12	115200 bps						
Index:	[0]	USS/MODBUS on RS485						
	[1]	USS on RS232 (reserved)						
Note:	This parameter, index 0, will alter the baudrate on RS485 regardless of the protocol selected in P2023.							
P2011[0...1]	**USS address**	0 - 31	0	U, T	-	-	U16	2
	Sets unique address for converter.							
Index:	[0]	USS on RS485						
	[1]	USS on RS232 (reserved)						
Note:	You can connect up to a further 30 converters via the serial link (i.e. 31 converters in total) and control them with the USS serial bus protocol.							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P2012[0...1]	**USS PZD length**	0 - 8	2	U, T	-	-	U16	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 devices. The PZD part of the USS telegram is used for the main setpoint, and to control the converter.							
Index:	[0]	USS on RS485						
	[1]	USS on RS232 (reserved)						
Notice:	USS protocol consists of PZD and PKW which can be changed by the user via P2012 and P2013 respectively.  STX Start of text LGE Length ADR Address PKW Parameter ID value PZD Process data BCC Block check character PKE Parameter ID IND Sub-index PWE Parameter value							
	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 P2012, where the first two words are either: a) control word and main setpoint or b) status word and actual value. When P2012 is greater or equal to 4 the additional control word is transferred as the 4th PZD-word (default setting).  STW Control word ZSW Status word PZD Process data HSW Main setpoint HIW Main actual value							

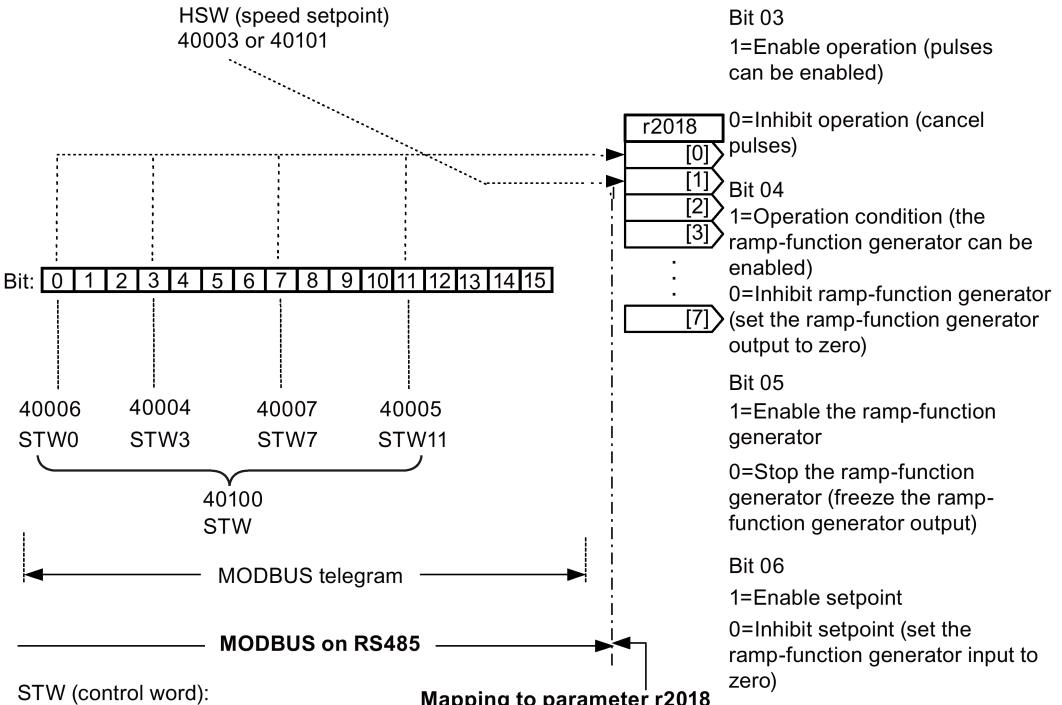
Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P2013[0...1]	**USS PKW length**	0 - 127	127	U, T	-	-	U16	3
	Defines the number of 16-bit words in PKW part of USS telegram. The PKW area can be varied. Depending on the particular requirement, 3-word, 4-word or variable word lengths can be parameterized. The PKW part of the USS telegram is used to read and write individual parameter values.							
	0	No words						
	3	3 words						
	4	4 words						
	127	Variable						
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		
Index:	[0]	USS on RS485						
	[1]	USS on RS232 (reserved)						
Notice:	USS protocol consists of PZD and PKW which can be changed by the user via P2012 and P2013 respectively. 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. P2013 = 3  P2013 = 4  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 converter 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.							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
	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 (P0700 = 2BC (hex))							
		P2013 = 3		P2013 = 4		P2013 = 127		
	Master → SINAMICS	22BC 0000 0006		22BC 0000 0000 0006		22BC 0000 0006 0000		
	SINAMICS → Master	12BC 0000 0006		12BC 0000 0000 0006		12BC 0000 0006		
Note:	If you want to use USS function blocks in TIA Portal to communicate with the converter, make sure that you set P2013[0] = 4.							
P2014[0...1]	**USS/MODBUS telegram off time [ms]**	0 - 65535	2000	T	-	-	U16	3
	Index 0 defines a time T_off after which a fault will be generated (F72) if no telegram is received via the USS/MODBUS channel RS485. Index 1 defines a time T_off after which a fault will be generated (F71) if no telegram is received via the USS channel RS232 (reserved).							
Index:	[0]	USS/MODBUS on RS485						
	[1]	USS on RS232 (reserved)						
Notice:	If time set to 0, no fault is generated (i.e. watchdog disabled).							
Note:	The telegram off time will function on RS485 regardless of the protocol set in P2023. If you write a value to register 40001 without changing the default value of register 40002, P2014[0] automatically applies the written value. If you write value 0 to register 40002, P2014[0] automatically changes to 0. If you write a value greater than zero to register 40002 without changing the default value of register 40001, P2014 automatically changes to the value set at last converter power-up; if you write a value greater than zero to register 40002 after changing the default value of register 40001, P2014 automatically changes to the value written to register 40001.							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
r2018[0...7]	**CO: PZD from USS/MODBUS on RS485**	-	-	-	4000H	-	U16	3
	Displays process data received via USS/MODBUS on RS485.							
	USS on RS485:  Note: Bit 10 must be set in the first PZD word of the telegram received via USS so that the converter will accept the process data as being valid. For this reason, the control word 1 must be transferred to the converter in the first PZD word.							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level

MODBUS on RS485:

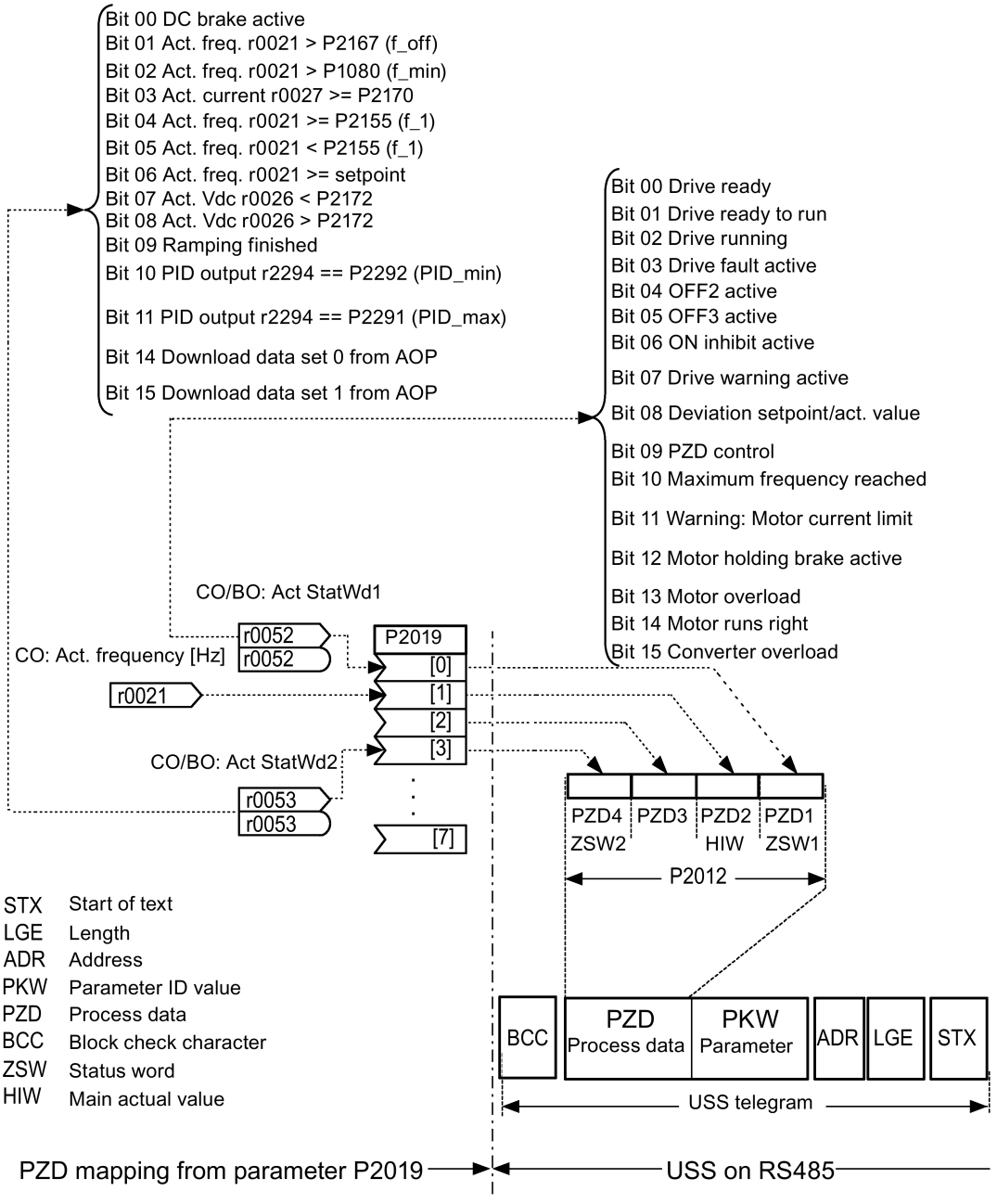


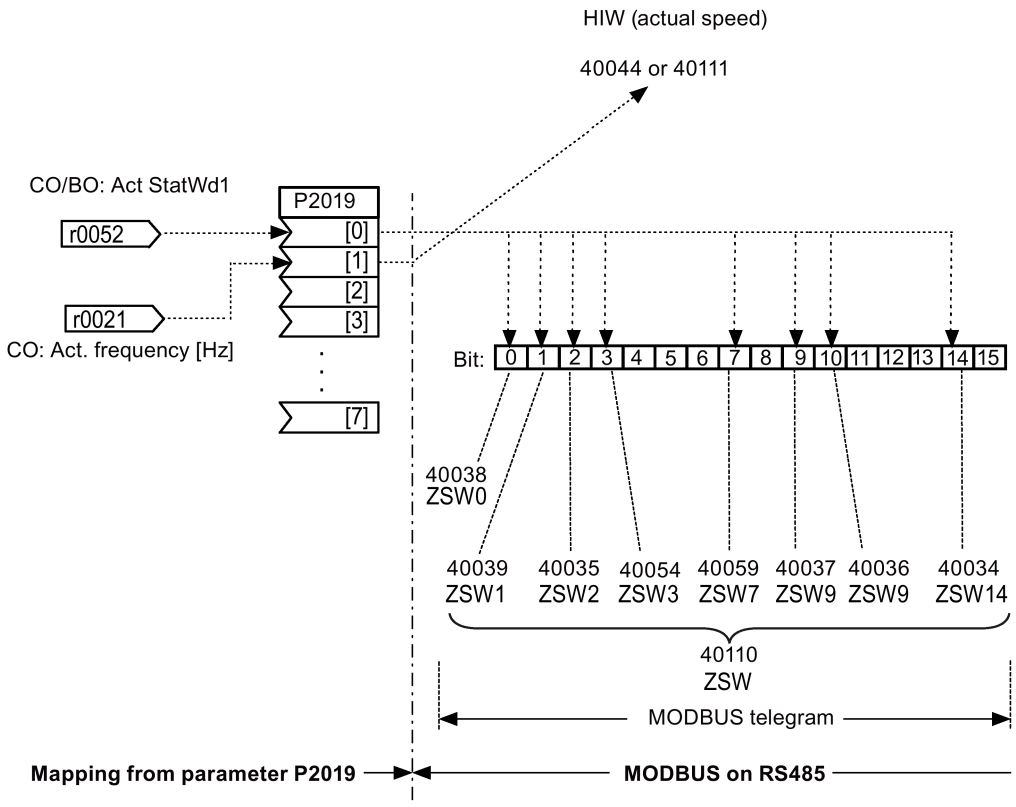
Index:	[0]	Received word 0
	[1]	Received word 1
	...	...
	[7]	Received word 7

Note:

Restrictions:

- If the above serial interface controls the converter (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 transferred 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 above serial interface controls the converter (P0700 or P0719).

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P2019[0...7]	**CI: PZD to USS/MODBUS on RS485**	-	52[0]	T	4000H	-	U32/I 16	3
	Displays process data transmitted via USS/MODBUS on RS485.							
	USS on RS485:  Note: P2019[0] = 52, P2019[1] = 21, P2019[3] = 53 are default settings.								

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
	MODBUS on RS485:  ZSW (status word): Bit 00 1=Ready to power-up Bit 01 1=Ready to operate (DC link loaded, pulses blocked) Bit 02 1=Operation enabled (drive follows n_set) Bit 03 1=Fault present Bit 04 1=No coast down active (OFF2 inactive) Bit 05 1=No fast stop active (OFF3 inactive) Bit 06 1=Power-on inhibit active Bit 07 1=Alarm present Bit 08 1=Speed setpoint - actual value deviation within tolerance t_off Bit 09 1=Control requested Bit 10 1=f or n comparison value reached/exceeded Bit 11 1=1, M, or P limit not reached Bit 12 Reserved Bit 13 1=No motor overtemperature alarm Bit 14 1=Motor rotates forwards (n_act >= 0) 0=Motor rotates backwards (n_act < 0) Bit 15 1=No alarm, thermal overload, power unit							
Index:	[0]	Transmitted word 0						
	[1]	Transmitted word 1						
	...	...						
	[7]	Transmitted word 7						
Note:	If r0052 not indexed, display does not show an index (".0").							
P2021	**Modbus address**	1 - 247	1	T	-	-	U16	2
	Sets unique address for converter.							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P2022	**Modbus reply timeout [ms]**	0 - 10000	1000	U, T	-	-	U16	3
	The time in which the converter is allowed to respond to the Modbus master. If the forming of a response needs more time than specified in this parameter, the processing is done, but no response is sent.							
P2023	**RS485 protocol selection**	0 - 3	1	T	-	-	U16	1
	Select the protocol which runs on the RS485 link.							
	0	None						
	1	USS						
	2	Modbus						
	3	Script terminal						
Notice:	After changing P2023, powercycle the converter. During the powercycle, wait until LED has gone off or the display has gone blank (may take a few seconds) before re-applying power. If P2023 has been changed via a PLC, make sure the change has been saved to EEPROM via P0971.							
r2024[0...1]	**USS/MODBUS error-free telegrams**	-	-	-	-	-	U16	3
	Displays number of error-free USS/MODBUS telegrams received.							
Index:	[0]	USS/MODBUS on RS485						
	[1]	USS on RS232 (reserved)						
Note:	The state of the telegram information on RS485 is reported regardless of the protocol set in P2023.							
r2025[0...1]	**USS/MODBUS rejected telegrams**	-	-	-	-	-	U16	3
	Displays number of USS/MODBUS telegrams rejected.							
Index:	See r2024							
Note:	See r2024							
r2026[0...1]	**USS/MODBUS character frame error**	-	-	-	-	-	U16	3
	Displays number of USS/MODBUS character frame errors.							
Index:	See r2024							
Note:	See r2024							
r2027[0...1]	**USS/MODBUS overrun error**	-	-	-	-	-	U16	3
	Displays number of USS/MODBUS with overrun error.							
Index:	See r2024							
Note:	See r2024							
r2028[0...1]	**USS/MODBUS parity error**	-	-	-	-	-	U16	3
	Displays number of USS/MODBUS telegrams with parity error.							
Index:	See r2024							
Note:	See r2024							
r2029[0...1]	**USS start not identified**	-	-	-	-	-	U16	3
	Displays number of USS telegrams with unidentified start.							
Index:	See r2024							
Note:	Not used on MODBUS.							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
r2030[0...1]	**USS/MODBUS BCC/CRC error**	-	-	-	-	-	U16	3
	Displays number of USS/MODBUS telegrams with BCC/CRC error.							
Index:	See r2024							
Note:	See r2024							
r2031[0...1]	**USS/MODBUS length error**	-	-	-	-	-	U16	3
	Displays number of USS/MODBUS telegrams with incorrect length.							
Index:	See r2024							
Note:	See r2024							
P2034	**MODBUS parity on RS485**	0 - 2	2	U, T	-	-	U16	2
	Parity of MODBUS telegrams on RS485.							
	0	No parity						
	1	Odd parity						
	2	Even parity						
Note:	Also see P2010 for baudrate and P2035 for stop bit settings. You must set P2034 to 0 if P2035=2.							
P2035	**MODBUS stop bits on RS485**	1 - 2	1	U, T	-	-	U16	2
	Number of stop bits in MODBUS telegrams on RS485.							
	1	1 stop bit						
	2	2 stop bits						
Note:	Also see P2010 for baudrate and P2034 for parity settings. You must set P2035 to 2 if P2034=0.							
r2036.0...15	**BO: CtrlWrd1 from USS/MODBUS on RS485**	-	-	-	-	-	U16	3
	Displays control word 1 from USS/MODBUS on RS485 (i.e. word 1 within USS/MODBUS = PZD1). See r0054 for the bit field description.							
Dependency:	See P2012							
r2037.0...15	**BO: CtrlWrd2 from USS on RS485 (USS)**	-	-	-	-	-	U16	3
	Displays control word 2 from USS on RS485 (i.e. word 4 within USS = PZD4). See r0055 for the bit field description.							
Dependency:	See P2012							
Note:	To enable the external fault (r2037 bit 13) facility via USS, the following parameters must be set: • P2012 = 4 • P2106 = 1							
r2053[0...7]	**I/O Extension Module identification**	-	0	-	-	-	U16	3
	Displays identification data of the I/O Extension Module.							
Index:	[0]	I/O Extension Module ID number						
	[1]	I/O Extension Module firmware version number (major)						
	[2]	I/O Extension Module firmware version number (minor)						
	[3]	I/O Extension Module firmware version number (hot fix)						
	[4]	I/O Extension Module firmware version number (internal)						
	[5]	Not used						
	[6]	Not used						
	[7]	Company ID (Siemens = 42)						

Parameter	Function		Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
r2067.0...12	**CO/BO: Digital input values status**		-	-	-	-	-	U16	3
	Displays status of digital inputs.								
	Bit	**Signal name**				**1 signal**		**0 signal**	
	00	Digital input 1				Yes		No	
	01	Digital input 2				Yes		No	
	02	Digital input 3				Yes		No	
	03	Digital input 4				Yes		No	
	04	Digital input 5				Yes		No	
	05	Digital input 6				Yes		No	
	11	Digital input AI1				Yes		No	
	12	Digital input AI2				Yes		No	
Note:	This is used for BICO connection without software intervention. The digital input 5 and 6 are provided by the optional I/O Extension Module.								
P2100[0...2]	**Alarm number selection**		0 - 65535	0	T	-	-	U16	3
	Selects up to 3 faults or alarms for non-default reactions.								
Example:	If, for example, an OFF3 is to be carried out instead of an OFF2 for a fault, the fault number has to be entered in P2100 and the desired reaction selected in P2101 (in this case (OFF3) P2101 = 3).								
Index:	[0]		Fault Number 1						
	[1]		Fault Number 2						
	[2]		Fault Number 3						
Note:	All fault codes have a default reaction to OFF2. Only the following faults (F11,F12,F20,F35,F71,F72,F85,F200,F221,F222, and F452) can be changed from the default reactions.								
P2101[0...2]	**Stop reaction value**		0 - 4	0	T	-	-	U16	3
	Sets converter stop reaction values for faults selected by P2100 (alarm number selection). This indexed parameter specifies the special reaction to the faults/warnings defined in P2100 indices 0 to 2.								
	0		No reaction, no display						
	1		OFF1 stop reaction						
	2		OFF2 stop reaction						
	3		OFF3 stop reaction						
	4		No reaction, warning only						
Index:	[0]		Stop reaction value 1						
	[1]		Stop reaction value 2						
	[2]		Stop reaction value 3						
Note:	Settings 1 - 3 are only available for fault codes. Setting 4 is only available for warnings. Index 0 (P2101) refers to fault/warning in index 0 (P2100).								
P2103[0...2]	**BI: 1. Faults acknowledgement**		0 - 4294967295	722.2	T	-	CDS	U32	3
	Defines first source of fault acknowledgement.								
Setting:	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)						

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P2104[0...2]	**BI: 2. Faults acknowledgement**	0 - 4294967295	0	T	-	CDS	U32	3
	Selects second source of fault acknowledgement.							
Setting:	See P2103							
P2106[0...2]	**BI: External fault**	0 - 4294967295	1	T	-	CDS	U32	3
	Selects source of external faults.							
Setting:	See P2103							
r2110[0...3]	**CO: Warning number**	-	-	-	-	-	U16	2
	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:	[0]	Recent Warnings --, warning 1						
	[1]	Recent Warnings --, warning 2						
	[2]	Recent Warnings -1, warning 3						
	[3]	Recent Warnings -1, warning 4						
Notice:	Indices 0 and 1 are not stored.							
Note:	The LED indicates the warning status in this case. The keypad will flash while a warning is active.							
P2111	**Total number of warnings**	0 - 4	0	T	-	-	U16	3
	Displays number of warning (up to 4) since last reset. Set to 0 to reset the warning history.							
P2113[0...2]	**Disable converter warnings**	0 - 1	0	T	-	-	U16	3
	Switches off reporting of converter warnings. Can be used in conjunction with P0503 as an adjunct to keep-running operation.							
	1	Converter warnings disabled						
	0	Converter warnings enabled						
Index:	[0]	Drive data set 0 (DDS0)						
	[1]	Drive data set 1 (DDS1)						
	[2]	Drive data set 2 (DDS2)						
Note:	See also P0503							
r2114[0...1]	**Run time counter**	-	-	-	-	-	U16	3
	Displays run time counter. It is the total time the converter has been powered up. When power is switched off, the value is saved, and then restored on powerup. The run time counter will be calculate as followed: Multiply the value in r2114[0] by 65536 and then add it to the value in r2114[1]. The resultant answer will be in seconds. This means that r2114[0] is not days. Total powerup time = 65536 * r2114[0] + r2114[1] seconds.							
Example:	If r2114[0] = 1 and r2114[1] = 20864 We get 1 * 65536 + 20864 = 86400 seconds which equals 1 day.							
Index:	[0]	System Time, Seconds, Upper Word						
	[1]	System Time, Seconds, Lower Word						

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P2115[0...2]	**Real time clock**	0 - 65535	257	T	-	-	U16	4
	Displays real time. All converters require an on-board clock function with which fault conditions may be time-stamped and logged. However, they have no battery backed Real Time Clock (RTC). Converters may support a software driven RTC which requires synchronization with the RTC supplied via a serial interface. The time is stored in a word array parameter P2115. The time will be set by USS Protocol standard "word array parameter write" telegrams. Once the last word is received in index 2, the software will start running the timer itself using internal running 1 millisecond tic. Hence becoming like RTC. If power-cycle takes place, then the real time must be sent again to the converter. 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)			
	The values are in binary form.							
Index:	[0]	Real Time, Seconds + Minutes						
	[1]	Real Time, Hours + Days						
	[2]	Real Time, Month + Year						
P2120	**Indication counter**	0 - 65535	0	U, T	-	-	U16	4
	Indicates total number of fault/warning events. This parameter is incremented whenever a fault/warning event occurs.							
P2150[0...2]	**Hysteresis frequency f_hys [Hz]**	0.00 - 10.00	3.00	U, T	-	DDS	Float	3
	Defines hysteresis level applied for comparing frequency and speed to threshold.							
Dependency:	See P1175.							
Note:	If P1175 is set, P2150 is also used to control the Dual Ramp function.							
P2151[0...2]	**CI: Speed setpoint for messages**	0 - 4294967295	1170[0]	U, T	-	DDS	U32	3
	Selects the source of setpoint frequency, actual frequency is compared with this frequency to detect frequency deviation (see monitoring bit r2197.7).							
P2155[0...2]	**Threshold frequency f_1 [Hz]**	0.00 - 550.00	30.00	U, T	-	DDS	Float	3
	Sets a threshold for comparing actual speed or frequency to threshold values f_1. This threshold controls status bits 4 and 5 in status word 2 (r0053).							
P2156[0...2]	**Delay time of threshold freq f_1 [ms]**	0 - 10000	10	U, T	-	DDS	U16	3
	Sets delay time prior to threshold frequency f_1 comparison (P2155).							
P2157[0...2]	**Threshold frequency f_2 [Hz]**	0.00 - 550.00	30.00	U, T	-	DDS	Float	2
	Threshold_2 for comparing speed or frequency to thresholds.							
Dependency:	See P1175.							
Note:	If P1175 is set, P2157 is also used to control the Dual Ramp function.							
P2158[0...2]	**Delay time of threshold freq f_2 [ms]**	0 - 10000	10	U, T	-	DDS	U16	2
	When comparing speed or frequency to threshold f_2 (P2157) this is the time delay before status bits are cleared.							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P2159[0...2]	**Threshold frequency f_3 [Hz]**	0.00 - 550.00	30.00	U, T	-	DDS	Float	2
	Threshold_3 for comparing speed or frequency to thresholds.							
Dependency:	See P1175.							
Note:	If P1175 is set, P2159 is also used to control the Dual Ramp function.							
P2160[0...2]	**Delay time of threshold freq f_3 [ms]**	0 - 10000	10	U, T	-	DDS	U16	2
	When comparing speed or frequency to threshold f_3 (P2159) this is the time delay before status bits are set.							
P2162[0...2]	**Hysteresis freq. for overspeed [Hz]**	0.00 - 25.00	3.00	U, T	-	DDS	Float	3
	Hysteresis speed (frequency) for overspeed detection. For V/f control modes the hysteresis acts below the maximum frequency.							
P2164[0...2]	**Hysteresis frequency deviation [Hz]**	0.00 - 10.00	3.00	U, T	-	DDS	Float	3
	Hysteresis frequency for detecting permitted deviation (from setpoint) or frequency or speed. This frequency controls bit 8 in status word 1 (r0052).							
P2166[0...2]	**Delay time ramp up completed [ms]**	0 - 10000	10	U, T	-	DDS	U16	3
	Delay time for signal that indicates completion of ramp-up.							
P2167[0...2]	**Switch-off frequency f_off [Hz]**	0.00 - 10.00	1.00	U, T	-	DDS	Float	3
	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 an OFF1 or OFF3 was applied and bit 1 is reset the converter will disable the pulse (OFF2).							
P2168[0...2]	**Delay time T_off [ms]**	0 - 10000	0	U, T	-	DDS	U16	3
	Defines time for which the converter may operate below switch-off frequency (P2167) before switch off occurs.							
Dependency:	Active if holding brake (P1215) not parameterized.							
P2170[0...2]	**Threshold current I_thresh [%]**	0.00 - 400.0	100.0	U, T	-	DDS	Float	3
	Defines threshold current relative to P0305 (rated motor current) to be used in comparisons of I_act and I_Thresh. This threshold controls bit 3 in status word 3 (r0053).							
P2171[0...2]	**Delay time current [ms]**	0 - 10000	10	U, T	-	DDS	U16	3
	Defines delay time prior to activation of current comparison.							
P2172[0...2]	**Threshold DC-link voltage [V]**	0 - 2000	800	U, T	-	DDS	U16	3
	Defines DC link voltage to be compared to actual voltage. This voltage controls bits 7 and 8 in status word 3 (r0053).							
P2173[0...2]	**Delay time DC-link voltage [ms]**	0 - 10000	10	U, T	-	DDS	U16	3
	Defines delay time prior to activation of threshold comparison.							
P2177[0...2]	**Delay time for motor is blocked [ms]**	0 - 10000	10	U, T	-	DDS	U16	3
	Delay time for identifying that the motor is blocked.							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P2179	**Current limit for no load identified [%]**	0.00 - 10.0	3.0	U, T	-	-	Float	3
	Threshold current for A922 (no load applied to converter) relative to P0305 (rated motor current).							
Notice:	If a motor setpoint cannot be entered and the current limit (P2179) is not exceeded, warning A922 (no load applied) is issued when delay time (P2180) expires.							
Note:	It may be that the motor is not connected or a phase could be missing.							
P2180	**Delay time for no-load detection [ms]**	0 - 10000	2000	U, T	-	-	U16	3
	Delay time for detecting a missing output load.							
P2181[0...2]	**Load monitoring mode**	0 - 6	0	T	-	DDS	U16	3
	Sets load monitoring mode. This function allows monitoring of mechanical failure of the converter train, e.g. a broken converter belt. It can also detect conditions which cause an overload, such as a jam. P2182 -P2190 are set to the following values when this parameter is changed from 0. P2182 = P1080 (Fmin) P2183 = P1082 (Fmax) * 0.8 P2184 = P1082 (Fmax) P2185 = r0333 (rated motor torque) * 1.1 P2186 = 0 P2187 = r0333 (rated motor torque) * 1.1 P2188 = 0 P2189 = r0333 (rated motor torque) * 1.1 P2190 = r0333 (rated motor torque)/2 This is achieved by comparing the actual frequency/torque curve with a programmed envelope (see P2182 - P2190). If the curve falls outside the envelope, a warning A952 or trip F452 is generated.							
	0	Load monitoring disabled						
	1	Warning: Low torque/frequency						
	2	Warning: High torque/frequency						
	3	Warning: High/low torque/frequency						
	4	Trip: Low torque/frequency						
	5	Trip: High torque/frequency						
	6	Trip: High/low torque/frequency						
P2182[0...2]	**Load monitoring threshold frequency 1 [Hz]**	0.00 - 550.00	5.00	U, T	-	DDS	Float	3
	Sets the lower frequency threshold f_1 for defining the area where the load monitoring is effective. The frequency torque envelope is defined by 9 parameters - 3 are frequency parameters (P2182 - P2184), and the other 6 define the low and high torque limits (P2185 - P2190) for each frequency.							
Dependency:	See P2181 for calculated default value.							
Note:	Below the threshold in P2182 and above the threshold in P2184, the load monitoring mode is not active. In this case the values for normal operation with the torque limits given in P1521 and P1520 are valid.							
P2183[0...2]	**Load monitoring threshold frequency 2 [Hz]**	0.00 - 550.00	30.00	U, T	-	DDS	Float	3
	Sets the frequency threshold f_2 for defining the envelope in which the torque values are valid. See P2182.							
Dependency:	See P2181 for calculated default value.							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P2184[0...2]	**Load monitoring threshold frequency 3 [Hz]**	0.00 - 550.00	50.00	U, T	-	DDS	Float	3
	Sets the upper frequency threshold f_3 for defining the area where the load monitoring is effective. See P2182.							
Dependency:	See P2181 for calculated default value.							
P2185[0...2]	**Upper torque threshold 1 [Nm]**	0.0 - 99999.0	Value in r0333	U, T	-	DDS	Float	3
	Upper limit threshold value 1 for comparing actual torque.							
Dependency:	This parameter is influenced by automatic calculations defined by P0340. See P2181 for calculated default value.							
Note:	The factory setting depends on rating data of Power Module and Motor.							
P2186[0...2]	**Lower torque threshold 1 [Nm]**	0.0 - 99999.0	0.0	U, T	-	DDS	Float	3
	Lower limit threshold value 1 for comparing actual torque.							
Dependency:	See P2181 for calculated default value.							
P2187[0...2]	**Upper torque threshold 2 [Nm]**	0.0 - 99999.0	Value in r0333	U, T	-	DDS	Float	3
	Upper limit threshold value 2 for comparing actual torque.							
Dependency:	This parameter is influenced by automatic calculations defined by P0340. See P2181 for calculated default value.							
Note:	See P2185							
P2188[0...2]	**Lower torque threshold 2 [Nm]**	0.0 - 99999.0	0.0	U, T	-	DDS	Float	3
	Lower limit threshold value 2 for comparing actual torque.							
Dependency:	See P2181 for calculated default value.							
P2189[0...2]	**Upper torque threshold 3 [Nm]**	0.0 - 99999.0	Value in r0333	U, T	-	DDS	Float	3
	Upper limit threshold value 3 for comparing actual torque.							
Dependency:	This parameter is influenced by automatic calculations defined by P0340. See P2181 for calculated default value.							
Note:	See P2185							
P2190[0...2]	**Lower torque threshold 3 [Nm]**	0.0 - 99999.0	0.0	U, T	-	DDS	Float	3
	Lower limit threshold value 3 for comparing actual torque.							
Dependency:	See P2181 for calculated default value.							
P2192[0...2]	**Load monitoring delay time [s]**	0 - 65	10	U, T	-	DDS	U16	3
	P2192 defines a delay before warning/trip becomes active. - It is used to eliminate events caused by transient conditions. - It is used for both methods of fault detection.							
r2197.0...12	**CO/BO: Monitoring word 1**	-	-	-	-	-	U16	3
	Monitoring word 1 which indicates the state of monitor functions. Each bit represents one monitor function.							
	Bit	**Signal name**			**1 signal**		**0 signal**	
	00	|f_act| <= P1080 (f_min)			Yes		No	
	01	|f_act| <= P2155 (f_1)			Yes		No	

Parameter	Function		Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
	02	|f_act| > P2155 (f_1)				Yes		No	
	03	f_act >= zero				Yes		No	
	04	f_act >= setp. (f_set)				Yes		No	
	05	|f_act| <= P2167 (f_off)				Yes		No	
	06	|f_act| >= P1082 (f_max)				Yes		No	
	07	f_act == setp. (f_set)				Yes		No	
	08	Act. current |r0027| >= P2170				Yes		No	
	09	Act. unfilt. Vdc < P2172				Yes		No	
	10	Act. unfilt. Vdc > P2172				Yes		No	
	11	Output load is not present				Yes		No	
	12	|f_act| > P1082 with delay				Yes		No	
r2198.0...12	**CO/BO: Monitoring word 2**		-	-	-	-	-	U16	3
	Monitoring word 2 which indicates the state of monitor functions. Each bit represents one monitor function.								
	Bit	**Signal name**				**1 signal**		**0 signal**	
	00	|f_act| <= P2157 (f_2)				Yes		No	
	01	|f_act| > P2157 (f_2)				Yes		No	
	02	|f_act| <= P2159 (f_3)				Yes		No	
	03	|f_act| > P2159 (f_3)				Yes		No	
	04	Unused				Yes		No	
	05	Reserved				Yes		No	
	06	Reserved				Yes		No	
	07	Reserved				Yes		No	
	08	Reserved				Yes		No	
	09	Reserved				Yes		No	
	10	Reserved				Yes		No	
	11	Load monitoring signals an alarm				Yes		No	
	12	Load monitoring signals a fault				Yes		No	
P2200[0...2]	**BI: Enable PID controller**		0 - 4294967295	0	U, T	-	CDS	U32	2
	Allows user to enable/disable the PID controller. Setting to 1 enables the PID closed-loop controller.								
Dependency:	Setting 1 automatically disables normal ramp times set in P1120 and P1121 and the normal frequency setpoints. Following an OFF1 or OFF3 command, however, the converter frequency will ramp down to zero using the ramp time set in P1121 (P1135 for OFF3).								
Notice:	The minimum and maximum motor frequencies (P1080 and P1082) as well as the skip frequencies (P1091 to P1094) remain active on the converter output. However, enabling skip frequencies with PID control can produce instabilities.								
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. The reverse command is not active when PID is active. Attention: P2200 and P2803 are locked parameter against each other. PID and FFB of the same data set cannot be active at same time.								

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P2201[0...2]	**Fixed PID setpoint 1 [%]**	-200.00 - 200.00	10.00	U, T	-	DDS	Float	2
	Defines fixed PID setpoint 1. There are 2 types of fixed frequencies: 1. Direct selection (P2216 = 1): – In this mode of operation 1 Fixed Frequency selector (P2220 to P2223) selects 1 fixed frequency. – If several inputs are active together, the selected frequencies are summed. E.g.: PID-FF1 + PID-FF2 + PID-FF3 + PID-FF4. 2. Binary coded selection (P2216 = 2): – Up to 16 different fixed frequency values can be selected using this method.							
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[0...2]	**Fixed PID setpoint 2 [%]**	-200.00 - 200.00	20.00	U, T	-	DDS	Float	2
	Defines fixed PID setpoint 2.							
Note:	See P2201							
P2203[0...2]	**Fixed PID setpoint 3 [%]**	-200.00 - 200.00	50.00	U, T	-	DDS	Float	2
	Defines fixed PID setpoint 3.							
Note:	See P2201							
P2204[0...2]	**Fixed PID setpoint 4 [%]**	-200.00 - 200.00	100.00	U, T	-	DDS	Float	2
	Defines fixed PID setpoint 4.							
Note:	See P2201							
P2205[0...2]	**Fixed PID setpoint 5 [%]**	-200.00 - 200.00	0.00	U, T	-	DDS	Float	2
	Defines fixed PID setpoint 5.							
Note:	See P2201							
P2206[0...2]	**Fixed PID setpoint 6 [%]**	-200.00 - 200.00	0.00	U, T	-	DDS	Float	2
	Defines fixed PID setpoint 6.							
Note:	See P2201							
P2207[0...2]	**Fixed PID setpoint 7 [%]**	-200.00 - 200.00	0.00	U, T	-	DDS	Float	2
	Defines fixed PID setpoint 7.							
Note:	See P2201							
P2208[0...2]	**Fixed PID setpoint 8 [%]**	-200.00 - 200.00	0.00	U, T	-	DDS	Float	2
	Defines fixed PID setpoint 8.							
Note:	See P2201							
P2209[0...2]	**Fixed PID setpoint 9 [%]**	-200.00 - 200.00	0.00	U, T	-	DDS	Float	2
	Defines fixed PID setpoint 9.							
Note:	See P2201							
P2210[0...2]	**Fixed PID setpoint 10 [%]**	-200.00 - 200.00	0.00	U, T	-	DDS	Float	2
	Defines fixed PID setpoint 10.							
Note:	See P2201							
P2211[0...2]	**Fixed PID setpoint 11 [%]**	-200.00 - 200.00	0.00	U, T	-	DDS	Float	2
	Defines fixed PID setpoint 11.							
Note:	See P2201							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P2212[0...2]	**Fixed PID setpoint 12 [%]**	-200.00 - 200.00	0.00	U, T	-	DDS	Float	2
	Defines fixed PID setpoint 12.							
Note:	See P2201							
P2213[0...2]	**Fixed PID setpoint 13 [%]**	-200.00 - 200.00	0.00	U, T	-	DDS	Float	2
	Defines fixed PID setpoint 13.							
Note:	See P2201							
P2214[0...2]	**Fixed PID setpoint 14 [%]**	-200.00 - 200.00	0.00	U, T	-	DDS	Float	2
	Defines fixed PID setpoint 14.							
Note:	See P2201							
P2215[0...2]	**Fixed PID setpoint 15 [%]**	-200.00 - 200.00	0.00	U, T	-	DDS	Float	2
	Defines fixed PID setpoint 15.							
Note:	See P2201							
P2216[0...2]	**Fixed PID setpoint mode**	1 - 2	1	T	-	DDS	U16	2
	Fixed frequencies for PID setpoint can be selected in two different modes. P2216 defines the mode.							
	1	Direct selection						
	2	Binary selection						
P2220[0...2]	**BI: Fixed PID setpoint select bit 0**	0 - 4294967295	722.3	T	-	CDS	U32	3
	Defines command source of fixed PID setpoint selection bit 0.							
P2221[0...2]	**BI: Fixed PID setpoint select bit 1**	0 - 4294967295	722.4	T	-	CDS	U32	3
	Defines command source of fixed PID setpoint selection bit 1.							
P2222[0...2]	**BI: Fixed PID setpoint select bit 2**	0 - 4294967295	722.5	T	-	CDS	U32	3
	Defines command source of fixed PID setpoint selection bit 2.							
P2223[0...2]	**BI: Fixed PID setpoint select bit 3**	0 - 4294967295	722.6	T	-	CDS	U32	3
	Defines command source of fixed PID setpoint selection bit 3.							
r2224	**CO: Actual fixed PID setpoint [%]**	-	-	-	-	-	Float	2
	Displays total output of PID fixed setpoint selection.							
Note:	r2224 = 100 % corresponds to 4000 hex.							
r2225.0	**BO: PID fixed frequency status**	-	-	-	-	-	U16	3
	Displays the status of PID fixed frequencies.							
	Bit	**Signal name**			**1 signal**		**0 signal**	
	00	Status of FF			Yes		No	
P2231[0...2]	**PID-MOP mode**	0 - 3	0	U, T	-	DDS	U16	2
	PID-MOP mode specification							
	Bit	**Signal name**			**1 signal**		**0 signal**	
	00	Setpoint store active			Yes		No	
	01	No On-state for MOP necessary			Yes		No	
Note:	Defines the operation mode of the motorized potentiometer. See P2240.							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P2232	**Inhibit reverse direction of PID-MOP**	0 - 1	1	T	-	-	U16	2
	Inhibits reverse setpoint selection of the PID-MOP.							
	0	Reverse direction is allowed						
	1	Reverse direction inhibited						
Note:	Setting 0 enables a change of motor direction using the motor potentiometer setpoint (increase/decrease frequency).							
P2235[0...2]	**BI: Enable PID-MOP (UP-cmd)**	0 - 4294967295	0	T	-	CDS	U32	3
	Defines source of UP command.							
Dependency:	To change setpoint: - Configure a digital input as source - Use UP/DOWN key on operator panel.							
Notice:	If this command is enabled by short pulses of less than 1 second, the frequency is changed in steps of 0.2 % (P0310). When the signal is enabled longer than 1 second the ramp generator accelerates with the rate of P2247.							
P2236[0...2]	**BI: Enable PID-MOP (DOWN-cmd)**	0 - 4294967295	0	T	-	CDS	U32	3
	Defines source of DOWN command.							
Dependency:	See P2235							
Notice:	If this command is enabled by short pulses of less than 1 second, the frequency is changed in steps of 0.2 % (P0310). When the signal is enabled longer than 1 second the ramp generator decelerates with the rate of P2248.							
P2240[0...2]	**Setpoint of PID-MOP [%]**	-200.00 - 200.00	10.00	U, T	-	DDS	Float	2
	Setpoint of the motor potentiometer. Allows user to set a digital PID setpoint in [%].							
Note:	P2240 = 100 % corresponds to 4000 hex. The start value gets active (for the MOP output) only at the start of the MOP. P2231 influences the start value behavior as follows: • P2231 = 0: P2240 gets immediately active in the OFF-state and when changed in the ON-state, it gets active after the next OFF and ON cycle. • P2231 = 1: The last MOP output before stop is stored as starting value, since storing is selected, so a change of P2240 while in ON-state has no effect. In OFF-state P2240 can be changed. • P2231 = 2: The MOP is active every time, so the change of P2240 affects after the next power-cycle or a change of P2231 to 0. • P2231 = 3: The last MOP output before power down is stored as starting value, since the MOP is active independent from the ON-command, a change of P2240 has only effect in the case of a change of P2231.							

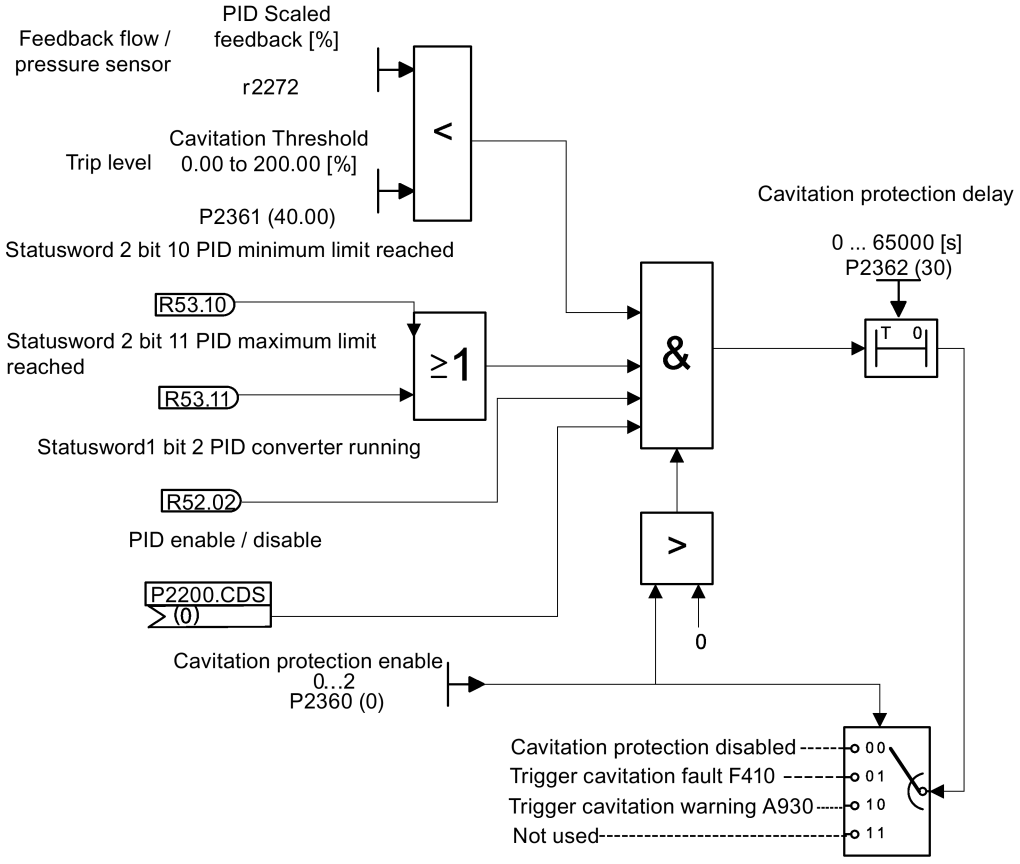
Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P2241[0...2]	**BI: PID-MOP select setpoint auto/manu**	0 - 4294967295	0	T	-	CDS	U32	3
	Sets the signal source to change over from manual to automatic mode. If using the motorized potentiometer in the manual mode the setpoint is changed using two signals for up and down, e.g. P2235 and P2236. If using the automatic mode the setpoint must be interconnected via the connector input (P2242). 0: manually 1: automatically							
Notice:	Refer to: P2235, P1036, P2242							
P2242[0...2]	**CI: PID-MOP auto setpoint**	0 - 4294967295	0	T	-	CDS	U32	3
	Sets the signal source for the setpoint of the motorized potentiometer if automatic mode P2241 is selected.							
Notice:	Refer to: P2241							
P2243[0...2]	**BI: PID-MOP accept rampgenerator setpoint**	0 - 4294967295	0	T	-	CDS	U32	3
	Sets the signal source for the setting command to accept the setting value for the motorized potentiometer. The value becomes effective for a 0/1 edge of the setting command.							
Notice:	Refer to: P2244							
P2244[0...2]	**CI: PID-MOP rampgenerator setpoint**	0 - 4294967295	0	T	-	CDS	U32	3
	Sets the signal source for the setpoint value for the MOP. The value becomes effective for a 0/1 edge of the setting command.							
Notice:	Refer to: P2243							
r2245	**CO: PID-MOP input frequency of the RFG [%]**	-	-	-	-	-	Float	3
	Displays the motorized potentiometer setpoint before it passed the PID-MOP RFG.							
P2247[0...2]	**PID-MOP ramp-up time of the RFG [s]**	0.00 - 1000.0	10.00	U, T	-	DDS	Float	2
	Sets the ramp-up time for the internal PID-MOP ramp-function generator. The setpoint is changed from zero up to limit defined in P1082 within this time.							
Notice:	Refer to: P2248, P1082							
P2248[0...2]	**PID-MOP ramp-down time of the RFG [s]**	0.00 - 1000.0	10.00	U, T	-	DDS	Float	2
	Sets the ramp-down time for the internal PID-MOP ramp-function generator. The setpoint is changed from limit defined in P1082 down to zero within this time.							
Notice:	Refer to: P2247, P1082							
r2250	**CO: Output setpoint of PID-MOP [%]**	-	-	-	PERCENT	-	Float	2
	Displays output setpoint of motor potentiometer.							
P2251	**PID mode**	0 - 1	0	T	-	-	U16	3
	Enables function of PID controller.							
	0	PID as setpoint						
	1	PID as trim						
Dependency:	Active when PID loop is enabled (see P2200).							
P2253[0...2]	**CI: PID setpoint**	0 - 4294967295	0	U, T	4000H	CDS	U32	2
	Defines setpoint source for PID setpoint input. This parameter allows the user to select the source of the PID setpoint. Normally, a digital setpoint is selected either using a fixed PID setpoint or an active setpoint.							

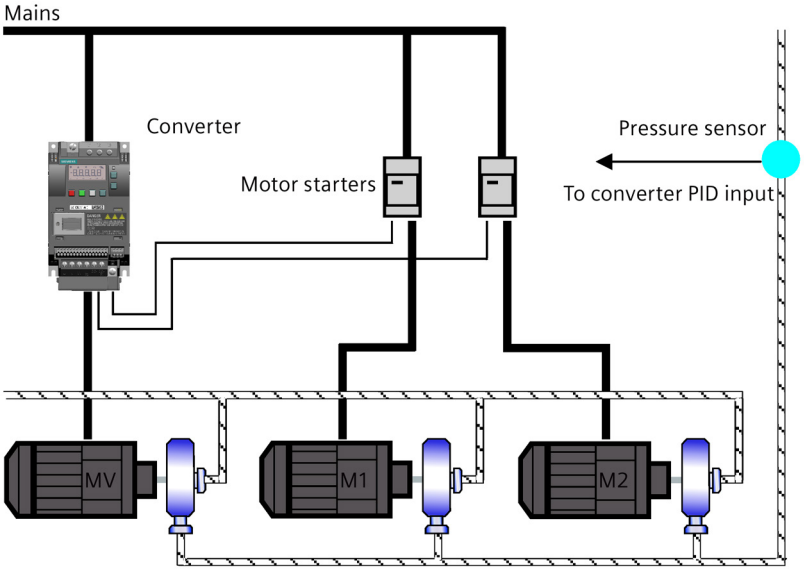
Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P2254[0...2]	**CI: PID trim source**	0 - 4294967295	0	U, T	4000H	CDS	U32	3
	Selects trim source for PID setpoint. This signal is multiplied by the trim gain and added to the PID setpoint.							
Setting:	755	Analog input 1						
	2224	Fixed PI setpoint (see P2201 to P2207)						
	2250	Active PI setpoint (see P2240)						
P2255	**PID setpoint gain factor**	0.00 - 100.00	100.00	U, T	-	-	Float	3
	Gain factor for PID setpoint. The PID setpoint input is multiplied by this gain factor to produce a suitable ratio between setpoint and trim.							
P2256	**PID trim gain factor**	0.00 - 100.00	100.00	U, T	-	-	Float	3
	Gain factor for PID trim. This gain factor scales the trim signal, which is added to the main PID setpoint.							
P2257	**Ramp-up time for PID setpoint [s]**	0.00 - 650.00	1.00	U, T	-	-	Float	2
	Sets the ramp-up time for the PID setpoint.							
Dependency:	P2200 = 1 (PID control is enabled) disables normal ramp-up time (P1120). PID ramp time is effective only on PID setpoint and active only when PID setpoint is changed or when RUN command is given (when PID setpoint uses this ramp to reach its value from 0%).							
Notice:	Setting the ramp-up time too short may cause the converter to trip, on overcurrent for example.							
P2258	**Ramp-down time for PID setpoint [s]**	0.00 - 650.00	1.00	U, T	-	-	Float	2
	Sets ramp-down time for PID setpoint.							
Dependency:	P2200 = 1 (PID control is enabled) disables normal ramp-down time (P1121). 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 converter to trip on overvoltage F2/overcurrent F1.							
r2260	**CO: PID setpoint after PID-RFG [%]**	-	-	-	-	-	Float	2
	Displays total active PID setpoint after PID-RFG.							
Note:	r2260 = 100 % corresponds to 4000 hex.							
P2261	**PID setpoint filter time constant [s]**	0.00 - 60.00	0.00	U, T	-	-	Float	3
	Sets a time constant for smoothing the PID setpoint.							
Note:	P2261 = 0 = no smoothing.							
r2262	**CO: Filtered PID setpoint after RFG [%]**	-	-	-	-	-	Float	3
	Displays filtered PID setpoint after PID-RFG. r2262 is the result of the value in r2260, filtered with PT1-Filter and the time constant given in P2261.							
Note:	r2262 = 100 % corresponds to 4000 hex.							
P2263	**PID controller type**	0 - 1	0	T	-	-	U16	3
	Sets the PID controller type.							
	0	D component on feedback signal						
	1	D component on error signal						
P2264[0...2]	**CI: PID feedback**	0 - 4294967295	0	U, T	4000H	CDS	U32	2
	Selects the source of the PID feedback signal.							
Setting:	See P2254							
Note:	When analog input is selected, offset and gain can be implemented using P0756 to P0760 (analog input scaling).							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P2265	**PID feedback filter time constant [s]**	0.00 - 60.00	0.00	U, T	-	-	Float	2
	Defines time constant for PID feedback filter.							
r2266	**CO: PID filtered feedback [%]**	-	-	-	-	-	Float	2
	Displays PID feedback signal.							
Note:	r2266 = 100 % corresponds to 4000 hex.							
P2267	**Maximum value for PID feedback [%]**	-200.00 - 200.00	100.00	U, T	-	-	Float	3
	Sets the upper limit for the value of the feedback signal.							
Notice:	When PID is enabled (P2200 = 1) and the signal rises above this value, the converter will trip with F222.							
Note:	P2267 = 100 % corresponds to 4000 hex.							
P2268	**Minimum value for PID feedback [%]**	-200.00 - 200.00	0.00	U, T	-	-	Float	3
	Sets lower limit for value of feedback signal.							
Notice:	When PID is enabled (P2200 = 1) and the signal drops below this value, the converter will trip with F221.							
Note:	P2268 = 100 % corresponds to 4000 hex.							
P2269	**Gain applied to PID feedback**	0.00 - 500.00	100.00	U, T	-	-	Float	3
	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**	0 - 3	0	U, T	-	-	U16	3
	Applies mathematical functions to the PID feedback signal, allowing multiplication of the result by P2269.							
	0	Disabled						
	1	Square root (root(x))						
	2	Square (x*x)						
	3	Cube (x*x*x)						
P2271	**PID transducer type**	0 - 1	0	U, T	-	-	U16	2
	Allows the user to select the transducer type for the PID feedback signal.							
	0	Disabled						
	1	Inversion of PID feedback signal						
Notice:	It is essential that you select the correct transducer type. If you are unsure whether 0 or 1 is applicable, you can determine the correct type as follows: 1. Disable the PID function (P2200 = 0). 2. Increase the motor frequency while measuring the feedback signal. 3. If the feedback signal increases with an increase in motor frequency, the PID transducer type should be 0. 4. If the feedback signal decreases with an increase in motor frequency the PID transducer type should be set to 1.							
r2272	**CO: PID scaled feedback [%]**	-	-	-	-	-	Float	2
	Displays PID scaled feedback signal.							
Note:	r2272 = 100 % corresponds to 4000 hex.							
r2273	**CO: PID error [%]**	-	-	-	-	-	Float	2
	Displays PID error (difference) signal between setpoint and feedback signals.							
Note:	r2273 = 100 % corresponds to 4000 hex.							

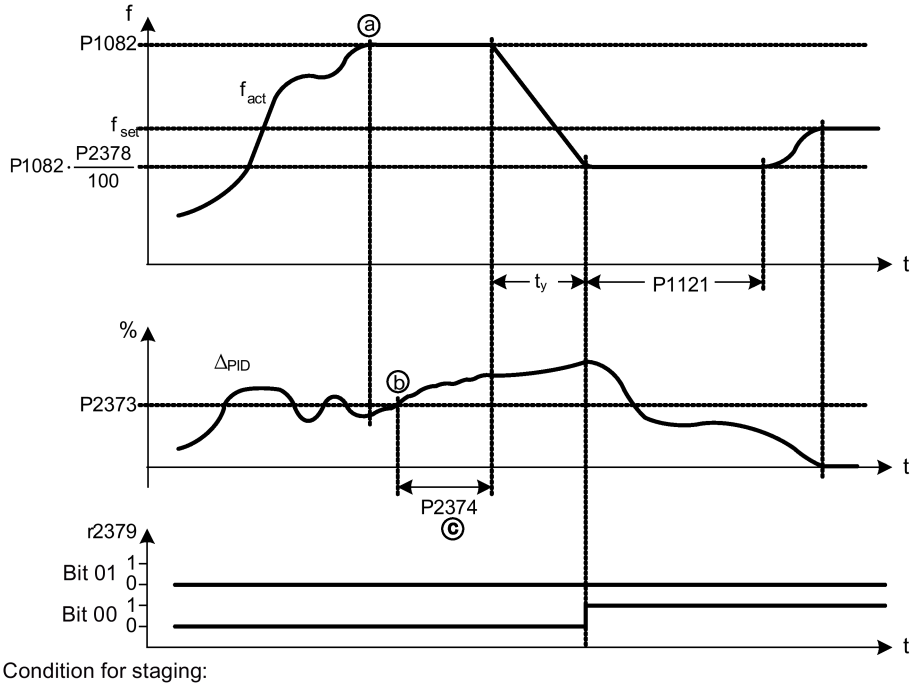
Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P2274	**PID derivative time [s]**	0.000 - 60.000	0.000	U, T	-	-	Float	2
	Sets PID derivative time. P2274 = 0: The derivative term does not have any effect (it applies a gain of 1).							
P2280	**PID proportional gain**	0.000 - 65.000	3.000	U, T	-	-	Float	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): The 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 [s]**	0.000 - 60.000	0.000	U, T	-	-	Float	2
	Sets integral time constant for PID controller.							
Note:	See P2280							
P2291	**PID output upper limit [%]**	-200.00 - 200.00	100.00	U, T	-	-	Float	2
	Sets upper limit for PID controller output							
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 [%]**	-200.00 - 200.00	0.00	U, T	-	-	Float	2
	Sets lower limit for the PID controller output.							
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 [s]**	0.00 - 100.00	1.00	U, T	-	-	Float	3
	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 converter 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 converter output frequency ramps down as set in P1121 (ramp-down time) or P1135 (OFF3 ramp-down time).							
r2294	**CO: Actual PID output [%]**	-	-	-	-	-	Float	2
	Displays PID output.							
Note:	r2294 = 100 % corresponds to 4000 hex.							
P2295	**Gain applied to PID output**	-100.00 - 100.00	100.00	U, T	-	-	Float	3
	Allows the user to scale the PID output as a percentage value. A gain of 100.0 % means that output signal has not changed from its default value.							
Note:	The ramp rate applied by the PID controller is clamped to a rate of 0.1s/100% to protect the converter.							
r2349	**CO/BO: PID status word**	-	0	-	-	-	U16	3
	Displays PID status word.							
	Bit	**Signal name**			**1 signal**		**0 signal**	
	00	PID disabled			Yes		No	
	01	PID limit reached			Yes		No	

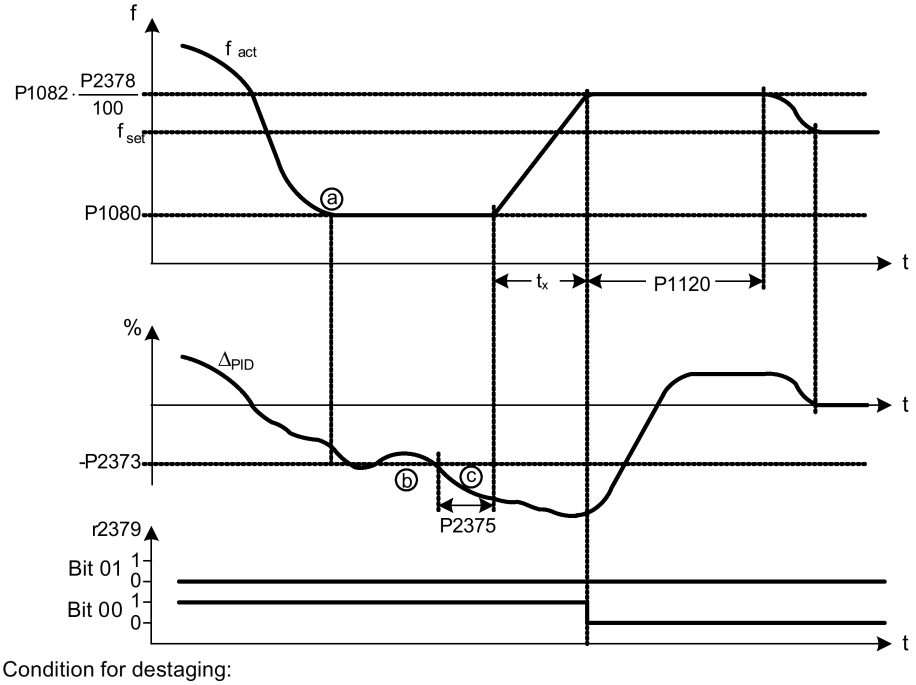
Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P2350	**PID autotune enable**	0 - 4	0	U, T	-	-	U16	2
	Enables autotune function of PID controller.							
	0	PID autotuning disabled						
	1	PID autotuning via Ziegler Nichols (ZN) standard						
	2	PID autotuning as 1 plus some overshoot (O/S)						
	3	PID autotuning as 2 little or no overshoot (O/S)						
	4	PID autotuning PI only, quarter damped response						
Dependency:	Active when PID loop is enabled (see P2200).							
Note:	• P2350 = 1 This is the standard Ziegler Nichols (ZN) tuning which should be a quarter damped response to a step. • P2350 = 2 This tuning will give some overshoot (O/S) but should be faster than option 1. • P2350 = 3 This tuning should give little or no overshoot but will not be as fast as option 2. • P2350 = 4 This tuning only changes values of P and I and should be a quarter damped response. The option to be selected depends on the application but broadly speaking option 1 will give a good response, whereas if a faster response is desired option 2 should be selected. If no overshoot is desired then option 3 is the choice. For cases where no D term is wanted then option 4 can be selected. The tuning procedure is the same for all options. It is just the calculation of P, I, and D values that are different. After autotune this parameter is set to zero (autotune completed).							
P2354	**PID tuning timeout length [s]**	60 - 65000	240	U, T	-	-	U16	3
	This parameter determines the time that the autotuning code will wait before aborting a tuning run if no oscillation has been obtained.							
P2355	**PID tuning offset [%]**	0.00 - 20.00	5.00	U, T	-	-	Float	3
	Sets applied offset and deviation for PID autotuning.							
Note:	This can be varied depending on plant conditions e.g. a very long system time constant might require a larger value.							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P2360[0...2]	**Enable cavitation protection**	0 - 2	0	U, T	-	DDS	U16	2
	Cavitation protection enabled. Will generate a fault/warning when cavitation conditions are deemed to be present.  Cavitation Protection Logic Diagram								
	0	Disable						
	1	Fault						
	2	Warn						
P2361[0...2]	**Cavitation threshold [%]**	0.00 - 200.00	40.00	U, T	-	DDS	Float	2
	Feedback threshold over which a fault/warning is triggered, as a percentage (%).							
P2362[0...2]	**Cavitation protection time [s]**	0 - 65000	30	U, T	-	DDS	U16	2
	The time for which cavitation conditions have to be present before a fault/warning is triggered.							
P2365[0...2]	**Hibernation enable/disable**	0 - 2	0	U, T	-	DDS	U16	2
	Select or disable the hibernation functionality.							
	0	Disabled						
	1	Frequency hibernation (The converter uses the frequency setpoint as the wakeup trigger. You can use P2366 and P2367 to configure this function.)						
	2	PID hibernation (The converter uses the PID error as the wakeup trigger. You can use P2390, P2391, and P2392 to configure this function.)						

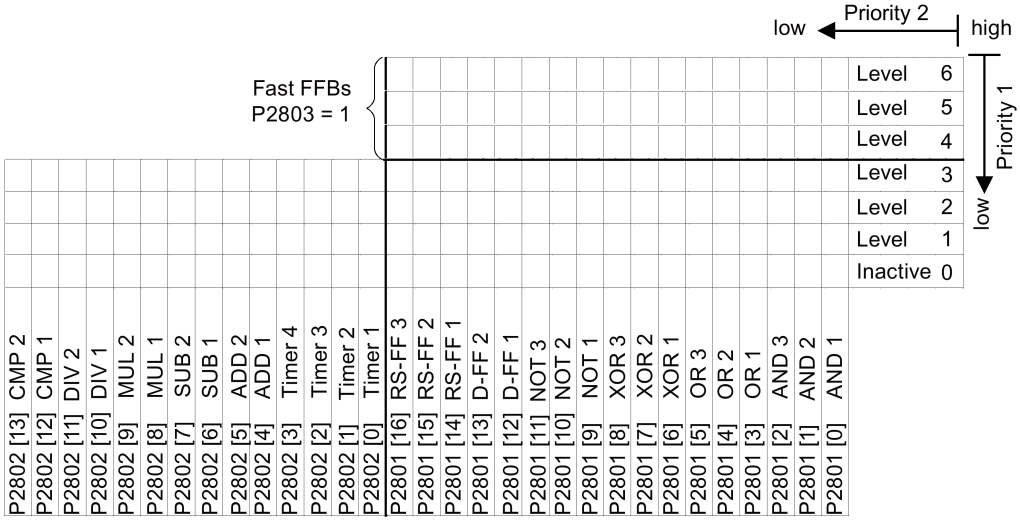
Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P2366[0...2]	**Delay before stopping motor [s]**	0 - 254	5	U, T	-	DDS	U16	3
	With hibernation enabled. If the frequency demand drops below the threshold there is a delay of P2366 seconds before the converter is stopped.							
P2367[0...2]	**Delay before starting motor [s]**	0 - 254	2	U, T	-	DDS	U16	3
	With hibernation enabled. If pulses have been disabled by the unit going into hibernation, and the frequency demand has increased to above the hibernation threshold, there will be a delay of P2367 seconds before the converter restarts.							
P2370[0...2]	**Motor staging stop mode**	0 - 1	0	T	-	DDS	U16	3
	Selects stop mode for external motors when motor staging is in use.							
	0	Normal stop						
	1	Sequence stop						
P2371[0...2]	**Motor staging configuration**	0 - 3	0	T	-	DDS	U16	3
	Selects configuration of external motors (M1, M2) used for motor staging feature.							
	0	Motor staging disabled						
	1	M1 = 1 x MV, M2 = Not fitted						
	2	M1 = 1 x MV, M2 = 1 x MV						
	3	M1 = 1 x MV, M2 = 2 x MV						
Caution:	For this kind of motor application it is mandatory to disable negative frequency setpoint!							
Note:	Motor staging allows the control of up to 2 additional staged pumps or fans, based on a PID control system. The complete system consists of one pump controlled by the converter with up to 2 further pumps/fans controlled from contactors or motor starters. The contactors or motor starter are controlled by outputs from the converter. The diagram below shows a typical pumping system. A similar system could be set up using fans and air ducts, instead of pumps and pipes. 							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
	By default the motor states are controlled from digital outputs. In the text below, the following terminology will be used: MV - Variable speed (Converter controlled motor) M1 - Motor switched with digital output 1 M2 - Motor switched with digital output 2 Staging: The process of starting one of the fixed speed motors. De-staging: The process of stopping one of the fixed speed motors. When the converter is running at maximum frequency, and the PID feedback indicates that a higher speed is required, the converter switches on (stages) one of the digital output controlled motors M1 and M2. At the same time, to keep the controlled variable as constant as possible, the converter must ramp down to minimum frequency. Therefore, during the staging process, PID control must be suspended (see P2378 and diagram below) **Staging of external motors (M1, M2)** Switch-on 1. 2. 3. 4. 5. 6. 7. t P2371 = 0 - - - - - - - - 1 - M1 M1 M1 M1 M1 M1 M1 2 - M1 M1+M2 M1+M2 M1+M2 M1+M2 M1+M2 M1+M2 3 - M1 M2 M1+M2 M1+M2 M1+M2 M1+M2 M1+M2							
	When the converter is running at minimum frequency, and the PID feedback indicates that a lower speed is required, the converter switches off (de-stages) one of the digital output controlled motors M1 and M2. In this case, the converter must ramp from minimum frequency to maximum frequency outside of PID control (see P2378 and diagram below). **Destaging of external motors (M1, M2)** Switch-off 1. 2. 3. 4. 5. 6. 7. t P2371 = 0 - - - - - - - - 1 M1 - - - - - - - 2 M1+M2 M1 - - - - - - 3 M1+M2 M2 M1 - - - - -							
P2372[0...2]	**Motor staging cycling**	0 - 1	0	T	-	DDS	U16	3
	Enables motor cycling for the motor staging feature. When enabled, the motor selected for staging/destaging is based on the hours run counter P2380. When staging, the motor with the least hours is switched on. When destaging, the motor with most hours is switched off. If staged motors are different sizes the choice of motor is first based on required motor size, and then if there is still a choice, on hours run.							
	0	Disabled						
	1	Enabled						
P2373[0...2]	**Motor staging hysteresis [%]**	0.0 - 200.0	20.0	U, T	PERCENT	DDS	Float	3
	P2373 as a percentage of PID setpoint that PID error r2273 must be exceeded before staging delay starts.							
Note:	The value of this parameter must always be smaller than delay override lockout timer P2377.							
P2374[0...2]	**Motor staging delay [s]**	0 - 650	30	U, T	-	DDS	U16	3
	Time that PID error r2273 must exceed motor staging hysteresis P2373 before staging occurs.							
P2375[0...2]	**Motor destaging delay [s]**	0 - 650	30	U, T	-	DDS	U16	3
	Time that PID error r2273 must exceed motor staging hysteresis P2373 before destaging occurs.							

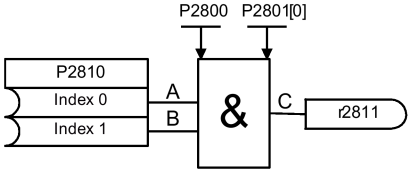
Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P2376[0...2]	**Motor staging delay override [%]**	0.0 - 200.0	25.0	U, T	PERCENT	DDS	Float	3
	P2376 as a percentage of PID setpoint. When the PID error r2273 exceeds this value, a motor is staged/destaged irrespective of the delay timers.							
Note:	The value of this parameter must always be larger than staging hysteresis P2373.							
P2377[0...2]	**Motor staging lockout timer [s]**	0 - 650	30	U, T	-	DDS	U16	3
	Time for which delay override is prevented after a motor has been staged or destaged. This prevents a second staging event immediately after a first, being caused by the transient conditions after the first staging event.							
P2378[0...2]	**CO: Motor staging frequency f_st [%]**	0.0 - 120.0	50.0	U, T	PERCENT	DDS	Float	3
	The frequency as a percentage of maximum frequency. During a (de) staging event, as the converter ramps from maximum to minimum frequency (or vice versa) this is the frequency at which the digital output is switched. This is illustrated by the following diagrams. Staging:  Condition for staging: ⓐ f_{act} ≥ P1082 ⓑ Δ_{PID} ≥ P2373 ⓒ $t_{ⓐⓑ}$ > P2374 $t_y = \left(1 - \frac{P2378}{100}\right) \cdot P1121$							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
	Destaging:  Condition for destaging: ⓐ $f_{act} \leq$ P1080 ⓑ $\Delta_{PID} \leq$ -P2373 ⓒ $t_{ⓐⓑ} >$ P2375 $t_x = \left(\frac{P2378}{100} - \frac{P1080}{P1082}\right) \cdot P1120$							
r2379.0...1	**CO/BO: Motor staging status word**	-	-	-	-	-	U16	3
	Output word from the motor staging feature that allows external connections to be made.							
	Bit	**Signal name**			**1 signal**		**0 signal**	
	00	Start motor 1			Yes		No	
	01	Start motor 2			Yes		No	
P2380[0...2]	**Motor staging hours run [h]**	0.0 - 429496720.0	0.0	U, T	-	-	Float	3
	Displays hours run for external motors. To reset the running hours, set the value to zero, any other value is ignored.							
Example:	P2380 = 0.1 ==> 6 min 60 min = 1 h							
Index:	[0]	Motor 1 hrs run						
	[1]	Motor 2 hrs run						
	[2]	Not used						

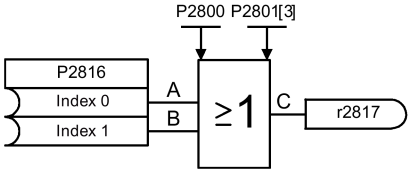
Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P2390	**PID hibernation setpoint [%]**	-200.00 - 200.00	0	U, T	-	-	Float	3
	The PID hibernation setpoint P2390 is a percentage of the rated motor frequency P0310. When the value of P2365 is set to 2 and the converter under PID control drops below the PID hibernation setpoint P2390, the PID hibernation timer P2391 is started. When the PID hibernation timer has expired, the converter is ramped down to stop and enters the PID hibernation mode.							
Notice:	PID hibernation is an added feature to enhance PID functionality, and switches off the motor when the converter is running at low setpoint. Note that this is an independent function from staging, although it can be used together with staging.							
Note:	If PID hibernation setpoint is 0, the PID hibernation function is disabled. The PID hibernation setpoint should be greater than the minimum frequency (P1080). Reverse operation is not allowed with the PID hibernation mode.							
P2391	**PID hibernation timer [s]**	0 - 254	0	T	-	-	U16	3
	When the PID hibernation timer P2391 has expired, the converter is ramped down to stop and enters the PID hibernation mode.							
P2392	**PID hibernation restart setpoint [%]**	-200.00 - 200.00	0	T	-	-	Float	3
	While in PID hibernation mode, the PID controller continues to generate the error r2273. Once this reaches the restart point P2392, the converter immediately ramps to the setpoint calculated by the PID controller.							
r2399	**CO/BO: PID hibernation status word**	-	0	-	-	-	U16	3
	Displays PID hibernation status word.							
	Bit	**Signal name**			**1 signal**		**0 signal**	
	Bit 00	Not used			Yes		No	
	Bit 01	PID hibernation enabled (PID hibernation is enabled and the converter is not in PID hibernation.)			Yes		No	
	Bit 02	Hibernation active (PID hibernation is enabled and the converter is in PID hibernation.)			Yes		No	
P2800	**Enable FFBs**	0 - 1	0	U, T	-	-	U16	3
	Free function blocks (FFB) are enabled in two steps: 1. P2800 enables all free function blocks (P2800 = 1). 2. P2801 and P2802 respectively, enable each free function block individually. Additionally fast free function blocks can be enabled via P2803 = 1.							
	0	Disable						
	1	Enable						
Dependency:	All active function blocks will be calculated in every 128 ms, fast free function blocks in every 8 ms.							

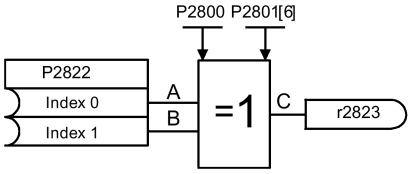
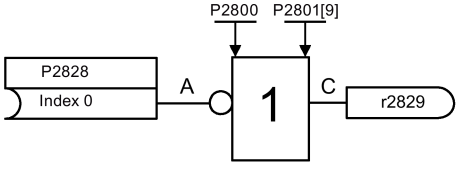
Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P2801[0...16]	**Activate FFBs**	0 - 6	0	U, T	-	-	U16	3
	P2801 and P2802 respectively, enable each free function block individually (P2801[x] > 0 or P2802[x] > 0). In addition, P2801 and P2802 determine the chronological order of each function block by setting the level in which the free function block will work. The following table shows that the priority decreases from right to left and from top to bottom. 							
	0	Not Active						
	1	Level 1						
	2	Level 2						
	...	...						
	6	Level 6						
Example:	P2801[3] = 2, P2801[4] = 2, P2802[3] = 3, P2802[4] = 2 FFBs will be calculated in following order: P2802[3], P2801[3] , P2801[4], P2802[4]							
Index:	[0]	Enable AND 1						
	[1]	Enable AND 2						
	[2]	Enable AND 3						
	[3]	Enable OR 1						
	[4]	Enable OR 2						
	[5]	Enable OR 3						
	[6]	Enable XOR 1						
	[7]	Enable XOR 2						
	[8]	Enable XOR 3						
	[9]	Enable NOT 1						
	[10]	Enable NOT 2						
	[11]	Enable NOT 3						
	[12]	Enable D-FF 1						
	[13]	Enable D-FF 2						
	[14]	Enable RS-FF 1						
	[15]	Enable RS-FF 2						
	[16]	Enable RS-FF 3						
Dependency:	Set P2800 to 1 to enable function blocks. All active function blocks will be calculated in every 128 ms, if set to level 1 to 3. Fast free function blocks (level 4 to 6) will be calculated in every 8 ms.							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P2802[0...13]	**Activate FFBs**	0 - 3	0	U, T	-	-	U16	3
	Enables free function blocks (FFB) and determines the chronological order of each function block. See P2801.							
	0	Not Active						
	1	Level 1						
	2	Level 2						
	3	Level 3						
Index:	[0]	Enable timer 1						
	[1]	Enable timer 2						
	[2]	Enable timer 3						
	[3]	Enable timer 4						
	[4]	Enable ADD 1						
	[5]	Enable ADD 2						
	[6]	Enable SUB 1						
	[7]	Enable SUB 2						
	[8]	Enable MUL 1						
	[9]	Enable MUL 2						
	[10]	Enable DIV 1						
	[11]	Enable DIV 2						
	[12]	Enable CMP 1						
	[13]	Enable CMP 2						
Dependency:	Set P2800 to 1 to enable function blocks. All active function blocks, enabled with P2802, will be calculated in every 128 ms.							
P2803[0...2]	**Enable Fast FFBs**	0 - 1	0	U, T	-	CDS	U16	3
	Fast free function blocks (FFB) are enabled in two steps: 1. P2803 enables the use of fast free function blocks (P2803 = 1). 2. P2801 enables each fast free function block individually and determines the chronological order (P2801[x] = 4 to 6).							
	0	Disable						
	1	Enable						
Dependency:	All active fast function blocks will be calculated in every 8 ms.							
Note:	Attention: P2200 and P2803 are locked parameter against each other. PID and FFB of the same data set cannot be active at same time.							
P2810[0...1]	**BI: AND 1**	0 - 4294967295	0	U, T	-	-	U32	3
	P2810[0], P2810[1] define inputs of AND 1 element, output is r2811.							
Index:	[0]	Binector input 0 (BI 0)						
	[1]	Binector input 1 (BI 1)						
Dependency:	P2801[0] assigns the AND element to the processing sequence.							

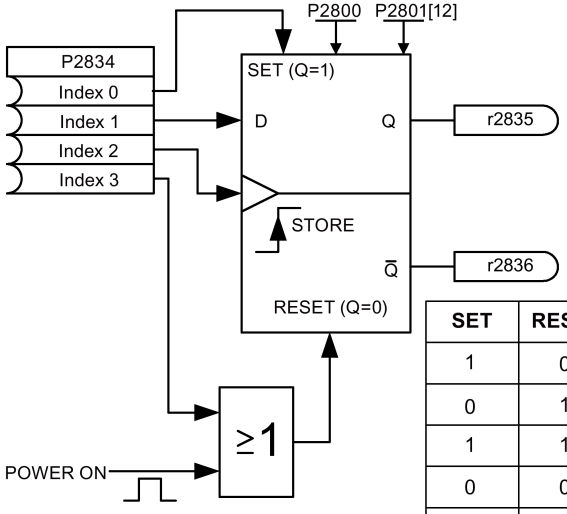


A	B	C
0	0	0
0	1	0
1	0	0
1	1	1

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
r2811.0	**BO: AND 1**	-	-	-	-	-	U16	3
	Output of AND 1 element. Displays and logic of bits defined in P2810[0], P2810[1].							
	Bit **Signal name**				**1 signal**		**0 signal**	
	00 Output of BO				Yes		No	
Dependency:	See P2810							
P2812[0...1]	**BI: AND 2**	0 - 4294967295	0	U, T	-	-	U32	3
	P2812[0], 2812[1] define inputs of AND 2 element, output is r2813.							
Index:	See P2810							
Dependency:	P2801[1] assigns the AND element to the processing sequence.							
r2813.0	**BO: AND 2**	-	-	-	-	-	U16	3
	Output of AND 2 element. Displays and logic of bits defined in P2812[0], P2812[1]. See r2811 for the bit field description.							
Dependency:	See P2812							
P2814[0...1]	**BI: AND 3**	0 - 4294967295	0	U, T	-	-	U32	3
	P2814[0], P2814[1] define inputs of AND 3 element, output is r2815.							
Index:	See P2810							
Dependency:	P2801[2] assigns the AND element to the processing sequence.							
r2815.0	**BO: AND 3**	-	-	-	-	-	U16	3
	Output of AND 3 element. Displays and logic of bits defined in P2814[0], P2814[1]. See r2811 for the bit field description.							
Dependency:	See P2814							
P2816[0...1]	**BI: OR 1**	0 - 4294967295	0	U, T	-	-	U32	3
	P2816[0], P2816[1] define inputs of OR 1 element, output is r2817.  A B C 0 0 0 0 1 1 1 0 1 1 1 1							
Index:	See P2810							
Dependency:	P2801[3] assigns the OR element to the processing sequence.							
r2817.0	**BO: OR 1**	-	-	-	-	-	U16	3
	Output of OR 1 element. Displays or logic of bits defined in P2816[0], P2816[1]. See r2811 for the bit field description.							
Dependency:	See P2816							
P2818[0...1]	**BI: OR 2**	0 - 4294967295	0	U, T	-	-	U32	3
	P2818[0], P2818[1] define inputs of OR 2 element, output is r2819.							
Index:	See P2810							
Dependency:	P2801[4] assigns the OR element to the processing sequence.							
r2819.0	**BO: OR 2**	-	-	-	-	-	U16	3
	Output of OR 2 element. Displays or logic of bits defined in P2818[0], P2818[1]. See r2811 for the bit field description.							
Dependency:	See P2818							
P2820[0...1]	**BI: OR 3**	0 - 4294967295	0	U, T	-	-	U32	3
	P2820[0], P2820[1] define inputs of OR 3 element, output is r2821.							
Index:	See P2810							
Dependency:	P2801[5] assigns the OR element to the processing sequence.							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
r2821.0	**BO: OR 3**	-	-	-	-	-	U16	3
	Output of OR 3 element. Displays or logic of bits defined in P2820[0], P2820[1]. See r2811 for the bit field description.							
Dependency:	See P2820							
P2822[0...1]	**BI: XOR 1**	0 - 4294967295	0	U, T	-	-	U32	3
	P2822[0], P2822[1] define inputs of XOR 1 element, output is r2823.  A B C 0 0 0 0 1 1 1 0 1 1 1 0							
Index:	See P2810							
Dependency:	P2801[6] assigns the XOR element to the processing sequence.							
r2823.0	**BO: XOR 1**	-	-	-	-	-	U16	3
	Output of XOR 1 element. Displays exclusive-or logic of bits defined in P2822[0], P2822[1]. See r2811 for the bit field description.							
Dependency:	See P2822							
P2824[0...1]	**BI: XOR 2**	0 - 4294967295	0	U, T	-	-	U32	3
	P2824[0], P2824[1] define inputs of XOR 2 element, output is r2825.							
Index:	See P2810							
Dependency:	P2801[7] assigns the XOR element to the processing sequence.							
r2825.0	**BO: XOR 2**	-	-	-	-	-	U16	3
	Output of XOR 2 element. Displays exclusive-or logic of bits defined in P2824[0], P2824[1]. See r2811 for the bit field description.							
Dependency:	See P2824							
P2826[0...1]	**BI: XOR 3**	0 - 4294967295	0	U, T	-	-	U32	3
	P2826[0], P2826[1] define inputs of XOR 3 element, output is r2827.							
Index:	See P2810							
Dependency:	P2801[8] assigns the XOR element to the processing sequence.							
r2827.0	**BO: XOR 3**	-	-	-	-	-	U16	3
	Output of XOR 3 element. Displays exclusive-or logic of bits defined in P2826[0], P2826[1]. See r2811 for the bit field description.							
Dependency:	See P2826							
P2828	**BI: NOT 1**	0 - 4294967295	0	U, T	-	-	U32	3
	P2828 defines input of NOT 1 element, output is r2829.  A C 0 1 1 0							
Dependency:	P2801[9] assigns the NOT element to the processing sequence.							
r2829.0	**BO: NOT 1**	-	-	-	-	-	U16	3
	Output of NOT 1 element. Displays not logic of bit defined in P2828. See r2811 for the bit field description.							
Dependency:	See P2828							

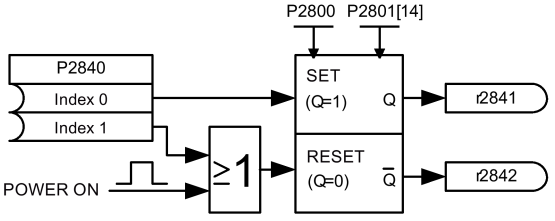
Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P2830	**BI: NOT 2**	0 - 4294967295	0	U, T	-	-	U32	3
	P2830 defines input of NOT 2 element, output is r2831.							
Dependency:	P2801[10] assigns the NOT element to the processing sequence.							
r2831.0	**BO: NOT 2**	-	-	-	-	-	U16	3
	Output of NOT 2 element. Displays not logic of bit defined in P2830. See r2811 for the bit field description.							
Dependency:	See P2830							
P2832	**BI: NOT 3**	0 - 4294967295	0	U, T	-	-	U32	3
	P2832 defines input of NOT 3 element, output is r2833.							
Dependency:	P2801[11] assigns the NOT element to the processing sequence.							
r2833.0	**BO: NOT 3**	-	-	-	-	-	U16	3
	Output of NOT 3 element. Displays not logic of bit defined in P2832. See r2811 for the bit field description.							
Dependency:	See P2832							
P2834[0...3]	**BI: D-FF 1**	0 - 4294967295	0	U, T	-	-	U32	3
	P2834[0], P2834[1], P2834[2], P2834[3] define inputs of D-FlipFlop 1, outputs are r2835, r2836.							



SET	RESET	D	STORE	Q	$\overline{Q}$
1	0	x	x	1	0
0	1	x	x	0	1
1	1	x	x	Q_{n-1}	$\overline{Q}_{n-1}$
0	0	1	↓	1	0
0	0	0	↓	0	1
POWER-ON				0	1

Index:	[0]	Binector input: Set
	[1]	Binector input: D input
	[2]	Binector input: Store pulse
	[3]	Binector input: Reset
Dependency:	P2801[12] assigns the D-FlipFlop to the processing sequence.	

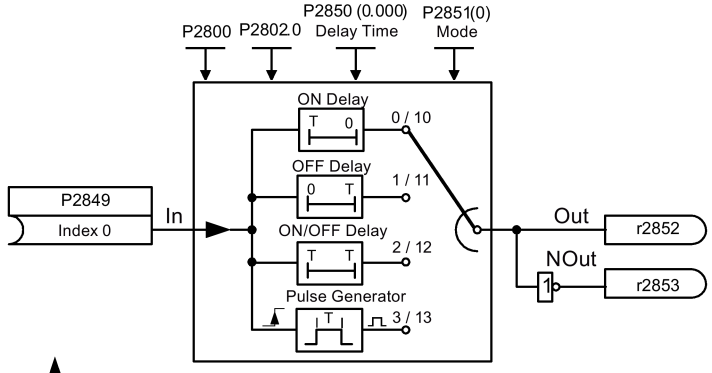
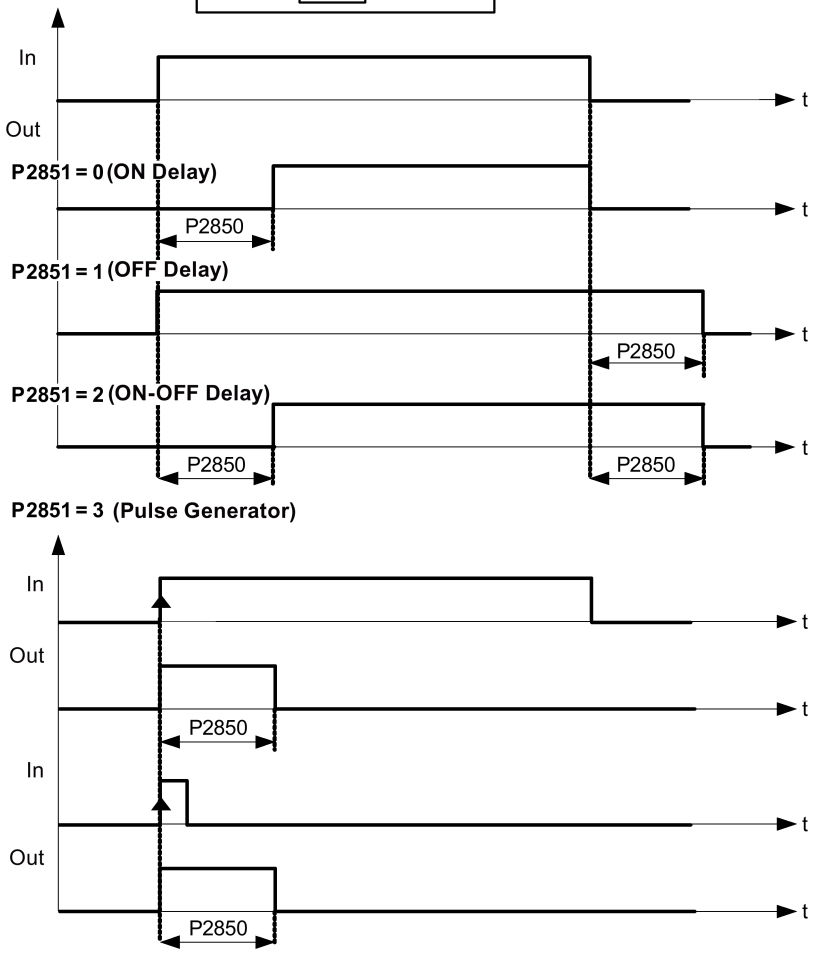
r2835.0	**BO: Q D-FF 1**	-	-	-	-	-	U16	3
	Displays output of D-FlipFlop 1, inputs are defined in P2834[0], P2834[1], P2834[2], P2834[3]. See r2811 for the bit field description.							
Dependency:	See P2834							
r2836.0	**BO: NOT-Q D-FF 1**	-	-	-	-	-	U16	3
	Displays Not-output of D-FlipFlop 1, inputs are defined in P2834[0], P2834[1], P2834[2], P2834[3]. See r2811 for the bit field description.							
Dependency:	See P2834							
P2837[0...3]	**BI: D-FF 2**	0 - 4294967295	0	U, T	-	-	U32	3
	P2837[0], P2837[1], P2837[2], P2837[3] define inputs of D-FlipFlop 2, outputs are r2838, r2839.							
Index:	See P2834							
Dependency:	P2801[13] assigns the D-FlipFlop to the processing sequence.							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
r2838.0	**BO: Q D-FF 2**	-	-	-	-	-	U16	3
	Displays output of D-FlipFlop 2, inputs are defined in P2837[0], P2837[1], P2837[2], P2837[3]. See r2811 for the bit field description.							
Dependency:	See P2837							
r2839.0	**BO: NOT-Q D-FF 2**	-	-	-	-	-	U16	3
	Displays Not-output of D-FlipFlop 2, inputs are defined in P2837[0], P2837[1], P2837[2], P2837[3]. See r2811 for the bit field description.							
Dependency:	See P2837							
P2840[0...1]	**BI: RS-FF 1**	0 - 4294967295	0	U, T	-	-	U32	3
	P2840[0], P2840[1] define inputs of RS-FlipFlop 1, outputs are r2841, r2842. 							

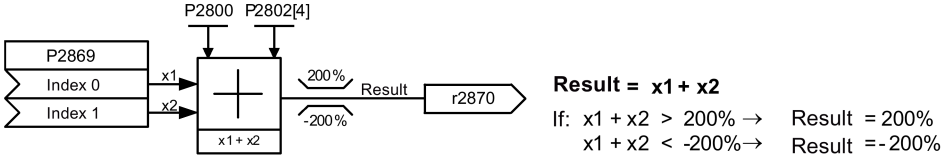
SET	RESET	Q	$\overline{Q}$
0	0	Q_{n-1}	$\overline{Q}_{n-1}$
0	1	0	1
1	0	1	0
1	1	Q_{n-1}	$\overline{Q}_{n-1}$
POWER-ON		0	1

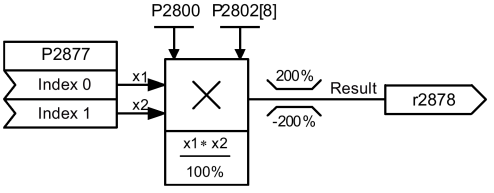
Index:	[0]	Binector input: Set
	[1]	Binector input: Reset
Dependency:	P2801[14] assigns the RS-FlipFlop to the processing sequence.	

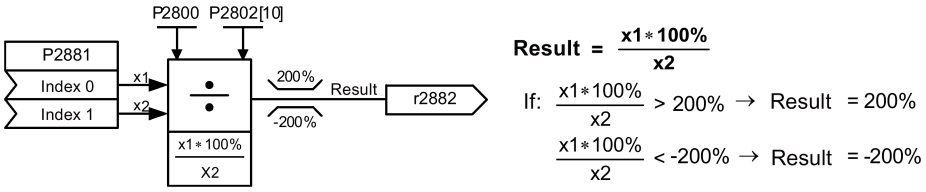
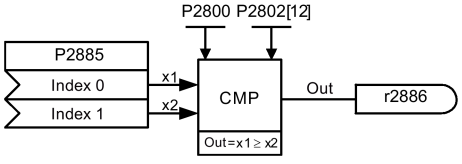
r2841.0	**BO: Q RS-FF 1**	-	-	-	-	-	U16	3
	Displays output of RS-FlipFlop 1, inputs are defined in P2840[0], P2840[1]. See r2811 for the bit field description.							
Dependency:	See P2840							
r2842.0	**BO: NOT-Q RS-FF 1**	-	-	-	-	-	U16	3
	Displays Not-output of RS-FlipFlop 1, inputs are defined in P2840[0], P2840[1]. See r2811 for the bit field description.							
Dependency:	See P2840							
P2843[0...1]	**BI: RS-FF 2**	0 - 4294967295	0	U, T	-	-	U32	3
	P2843[0], P2843[1] define inputs of RS-FlipFlop 2, outputs are r2844, r2845.							
Index:	See P2840							
Dependency:	P2801[15] assigns the RS-FlipFlop to the processing sequence.							
r2844.0	**BO: Q RS-FF 2**	-	-	-	-	-	U16	3
	Displays output of RS-FlipFlop 2, inputs are defined in P2843[0], P2843[1]. See r2811 for the bit field description.							
Dependency:	See P2843							
r2845.0	**BO: NOT-Q RS-FF 2**	-	-	-	-	-	U16	3
	Displays Not-output of RS-FlipFlop 2, inputs are defined in P2843[0], P2843[1]. See r2811 for the bit field description.							
Dependency:	See P2843							
P2846[0...1]	**BI: RS-FF 3**	0 - 4294967295	0	U, T	-	-	U32	3
	P2846[0], P2846[1] define inputs of RS-FlipFlop 3, outputs are r2847, r2848.							
Index:	See P2840							
Dependency:	P2801[16] assigns the RS-FlipFlop to the processing sequence.							
r2847.0	**BO: Q RS-FF 3**	-	-	-	-	-	U16	3
	Displays output of RS-FlipFlop 3, inputs are defined in P2846[0], P2846[1]. See r2811 for the bit field description.							
Dependency:	See P2846							

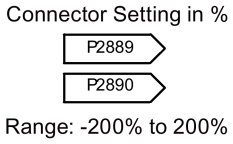
Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
r2848.0	**BO: NOT-Q RS-FF 3**	-	-	-	-	-	U16	3
	Displays Not-output of RS-FlipFlop 3, inputs are defined in P2846[0], P2846[1]. See r2811 for the bit field description.							
Dependency:	See P2846							
P2849	**BI: Timer 1**	0 - 4294967295	0	U, T	-	-	U32	3
	Define input signal of timer 1. P2849, P2850, P2851 are the inputs of the timer, outputs are r2852, r2853.   							
Dependency:	P2802[0] assigns the timer to the processing sequence.							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P2850	**Delay time of timer 1 [s]**	0.0 - 9999.9	0.0	U, T	-	-	Float	3
	Defines delay time of timer 1. P2849, P2850, P2851 are the inputs of the timer, outputs are r2852, r2853.							
Dependency:	See P2849							
P2851	**Mode timer 1**	0 - 13	0	U, T	-	-	U16	3
	Selects mode of timer 1. P2849, P2850, P2851 are the inputs of the timer, outputs are r2852, r2853.							
	0	ON delay (seconds)						
	1	OFF delay (seconds)						
	2	ON/OFF delay (seconds)						
	3	Pulse generator (seconds)						
	10	ON delay (minutes)						
	11	OFF delay (minutes)						
	12	ON/OFF delay (minutes)						
	13	Pulse generator (minutes)						
Dependency:	See P2849							
r2852.0	**BO: Timer 1**	-	-	-	-	-	U16	3
	Displays output of timer 1. P2849, P2850, P2851 are the inputs of the timer, outputs are r2852, r2853. See r2811 for the bit field description.							
Dependency:	See P2849							
r2853.0	**BO: Nout timer 1**	-	-	-	-	-	U16	3
	Displays Not-output of timer 1. P2849, P2850, P2851 are the inputs of the timer, outputs are r2852, r2853. See r2811 for the bit field description.							
Dependency:	See P2849							
P2854	**BI: Timer 2**	0 - 4294967295	0	U, T	-	-	U32	3
	Define input signal of timer 2. P2854, P2855, P2856 are the inputs of the timer, outputs are r2857, r2858.							
Dependency:	P2802[1] assigns the timer to the processing sequence.							
P2855	**Delay time of timer 2 [s]**	0.0 - 9999.9	0.0	U, T	-	-	Float	3
	Defines delay time of timer 2. P2854, P2855, P2856 are the inputs of the timer, outputs are r2857, r2858.							
Dependency:	See P2854							
P2856	**Mode timer 2**	0 - 13	0	U, T	-	-	U16	3
	Selects mode of timer 2. P2854, P2855, P2856 are the inputs of the timer, outputs are r2857, r2858. See P2851 for value description.							
Dependency:	See P2854							
r2857.0	**BO: Timer 2**	-	-	-	-	-	U16	3
	Displays output of timer 2. P2854, P2855, P2856 are the inputs of the timer, outputs are r2857, r2858. See r2811 for the bit field description.							
Dependency:	See P2854							
r2858.0	**BO: Nout timer 2**	-	-	-	-	-	U16	3
	Displays Not-output of timer 2 P2854, P2855, P2856 are the inputs of the timer, outputs are r2857, r2858. See r2811 for the bit field description.							
Dependency:	See P2854							
P2859	**BI: Timer 3**	0 - 4294967295	0	U, T	-	-	U32	3
	Define input signal of timer 3. P2859, P2860, P2861 are the inputs of the timer, outputs are r2862, r2863.							
Dependency:	P2802[2] assigns the timer to the processing sequence.							
P2860	**Delay time of timer 3 [s]**	0.0 - 9999.9	0.0	U, T	-	-	Float	3
	Defines delay time of timer 3. P2859, P2860, P2861 are the inputs of the timer, outputs are r2862, r2863.							
Dependency:	See P2859							

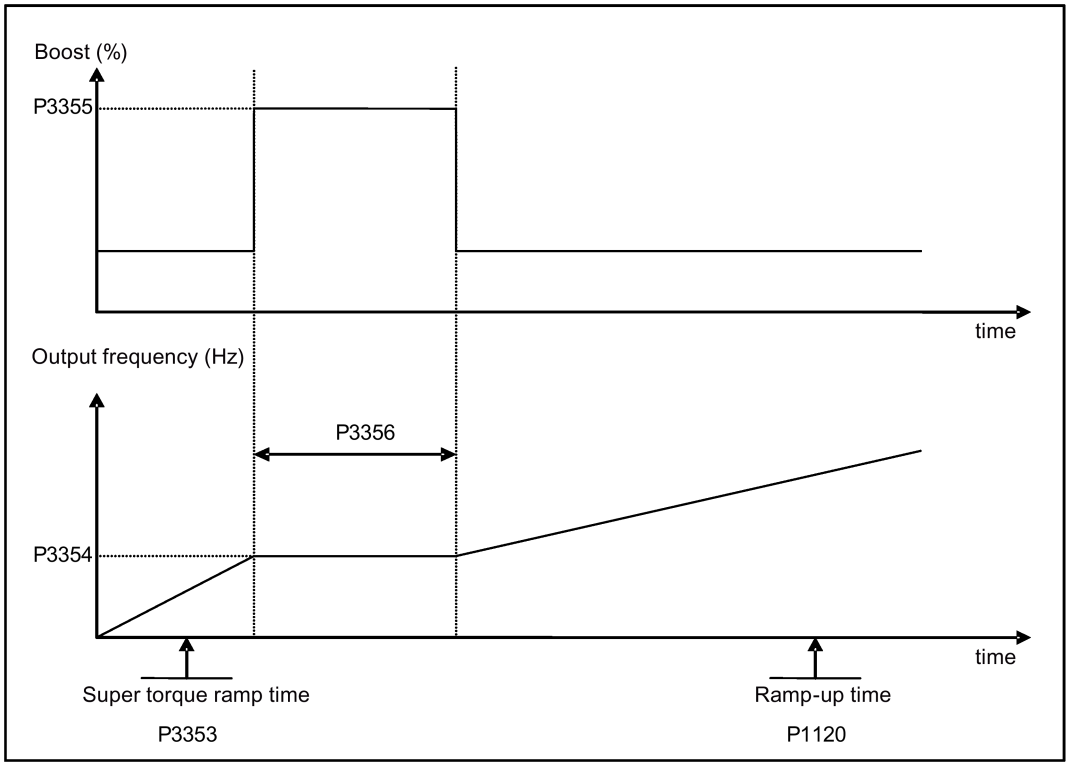
Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P2861	**Mode timer 3**	0 - 13	0	U, T	-	-	U16	3
	Selects mode of timer 3. P2859, P2860, P2861 are the inputs of the timer, outputs are r2862, r2863. See P2851 for value description.							
Dependency:	See P2859							
r2862.0	**BO: Timer 3**	-	-	-	-	-	U16	3
	Displays output of timer 3. P2859, P2860, P2861 are the inputs of the timer, outputs are r2862, r2863. See r2811 for the bit field description.							
Dependency:	See P2859							
r2863.0	**BO: Nout timer 3**	-	-	-	-	-	U16	3
	Displays Not-output of timer 3. P2859, P2860, P2861 are the inputs of the timer, outputs are r2862, r2863. See r2811 for the bit field description.							
Dependency:	See P2859							
P2864	**BI: Timer 4**	0 - 4294967295	0	U, T	-	-	U32	3
	Define input signal of timer 4. P2864, P2865, P2866 are the inputs of the timer, outputs are P2867, P2868.							
Dependency:	P2802[3] assigns the timer to the processing sequence.							
P2865	**Delay time of timer 4 [s]**	0.0 - 9999.9	0.0	U, T	-	-	Float	3
	Defines delay time of timer 4. P2864, P2865, P2866 are the inputs of the timer, outputs are r2867, r2868.							
Dependency:	See P2864							
P2866	**Mode timer 4**	0 - 13	0	U, T	-	-	U16	3
	Selects mode of timer 4. P2864, P2865, P2866 are the inputs of the timer, outputs are r2867, r2868. See P2851 for value description.							
Dependency:	See P2864							
r2867.0	**BO: Timer 4**	-	-	-	-	-	U16	3
	Displays output of timer 4. P2864, P2865, P2866 are the inputs of the timer, outputs are r2867, r2868. See r2811 for the bit field description.							
Dependency:	See P2864							
r2868.0	**BO: Nout timer 4**	-	-	-	-	-	U16	3
	Displays Not-output of timer 4. P2864, P2865, P2866 are the inputs of the timer, outputs are r2867, r2868. See r2811 for the bit field description.							
Dependency:	See P2864							
P2869[0...1]	**CI: ADD 1**	0 - 4294967295	0	U, T	4000H	-	U32	3
	Define inputs of Adder 1, result is in r2870. 							
Index:	[0]	Connector input 0 (CI 0)						
	[1]	Connector input 1 (CI 1)						
Dependency:	P2802[4] assigns the Adder to the processing sequence.							
r2870	**CO: ADD 1**	-	-	-	-	-	Float	3
	Result of Adder 1.							
Dependency:	See P2869							
P2871[0...1]	**CI: ADD 2**	0 - 4294967295	0	U, T	4000H	-	U32	3
	Define inputs of Adder 2, result is in r2872.							
Index:	See P2869							
Dependency:	P2802[5] assigns the Adder to the processing sequence.							

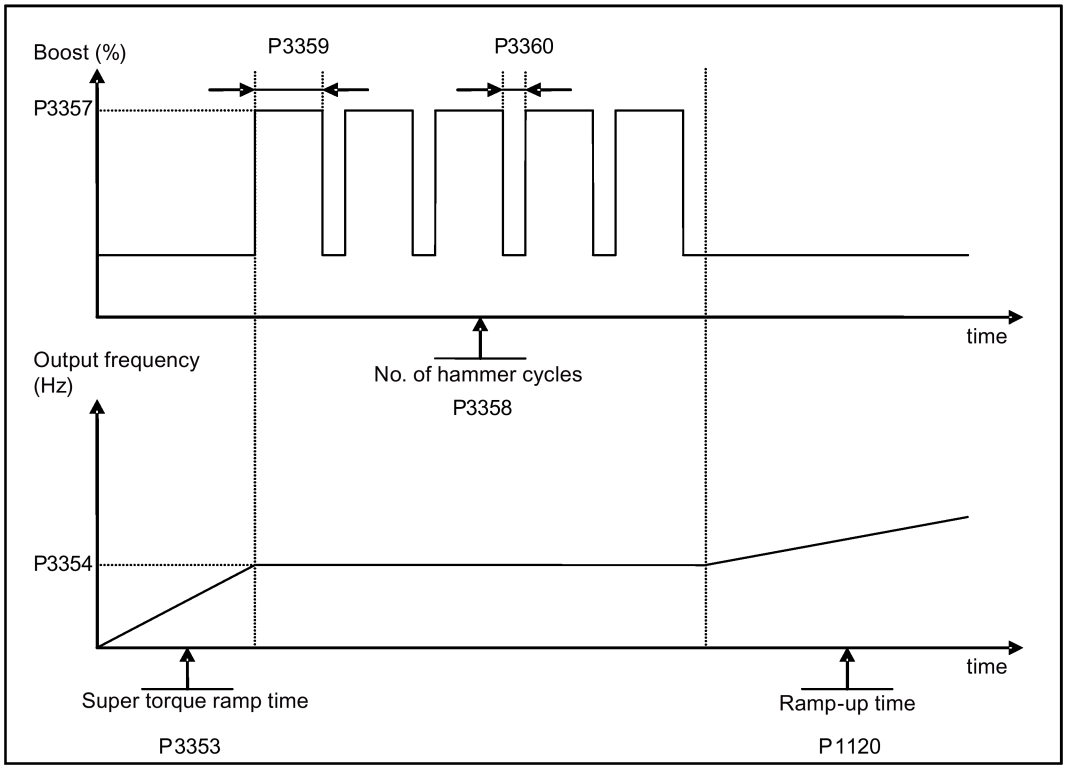
Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
r2872	**CO: ADD 2**	-	-	-	-	-	Float	3
	Result of Adder 2.							
Dependency:	See P2871							
P2873[0...1]	**CI: SUB 1**	0 - 4294967295	0	U, T	4000H	-	U32	3
	Define inputs of Subtractor 1, result is in r2874.  **Result = x1 - x2** If: x1 - x2 > 200% → Result = 200% x1 - x2 < -200% → Result = -200%							
Index:	See P2869							
Dependency:	P2802[6] assigns the Subtractor to the processing sequence.							
r2874	**CO: SUB 1**	-	-	-	-	-	Float	3
	Result of Subtractor 1.							
Dependency:	See P2873							
P2875[0...1]	**CI: SUB 2**	0 - 4294967295	0	U, T	4000H	-	U32	3
	Define inputs of Subtractor 2, result is in r2876.							
Index:	See P2869							
Dependency:	P2802[7] assigns the Subtractor to the processing sequence.							
r2876	**CO: SUB 2**	-	-	-	-	-	Float	3
	Result of Subtractor 2.							
Dependency:	See P2875							
P2877[0...1]	**CI: MUL 1**	0 - 4294967295	0	U, T	4000H	-	U32	3
	Define inputs of Multiplier 1, result is in r2878.  **Result = $\frac{x1 * x2}{100\%}$** If: $\frac{x1 * x2}{100\%}$ > 200% → Result = 200% $\frac{x1 * x2}{100\%}$ < -200% → Result = -200%							
Index:	See P2869							
Dependency:	P2802[8] assigns the Multiplier to the processing sequence.							
r2878	**CO: MUL 1**	-	-	-	-	-	Float	3
	Result of Multiplier 1.							
Dependency:	See P2877							
P2879[0...1]	**CI: MUL 2**	0 - 4294967295	0	U, T	4000H	-	U32	3
	Define inputs of Multiplier 2, result is in r2880.							
Index:	See P2869							
Dependency:	P2802[9] assigns the Multiplier to the processing sequence.							
r2880	**CO: MUL 2**	-	-	-	-	-	Float	3
	Result of Multiplier 2.							
Dependency:	See P2879							

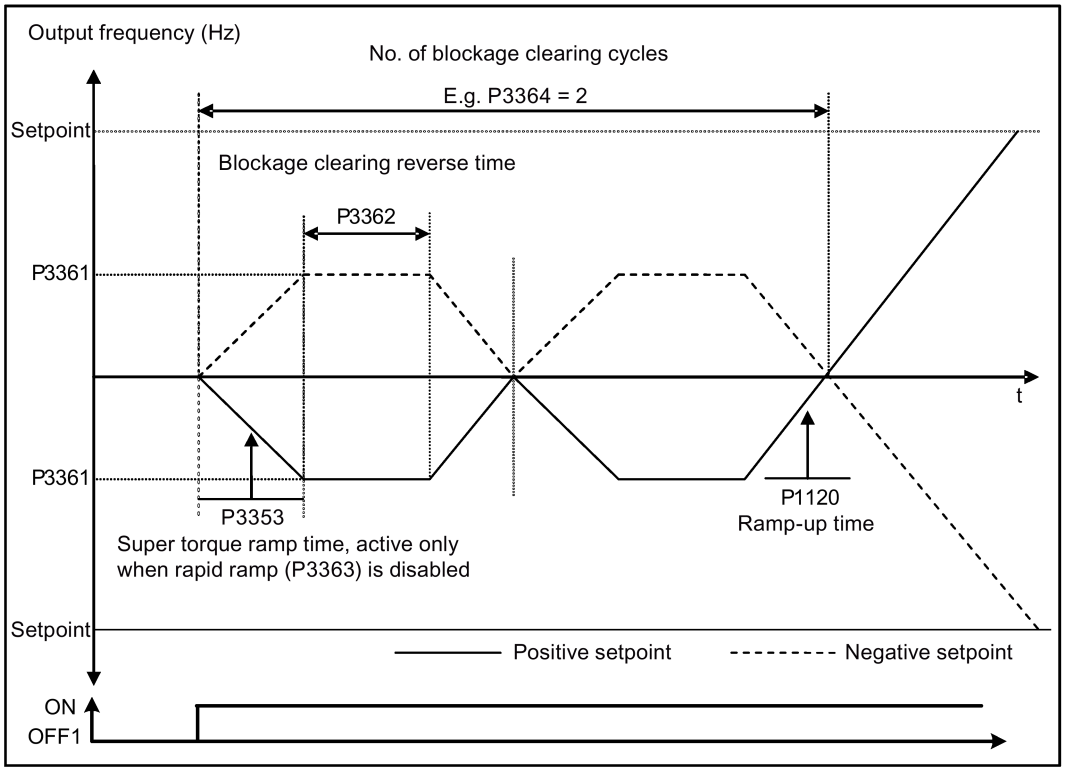
Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P2881[0...1]	**CI: DIV 1**	0 - 4294967295	0	U, T	4000H	-	U32	3
	Define inputs of Divider 1, result is in r2882.  $\text{Result} = \frac{x1 * 100\%}{x2}$ If: $\frac{x1 * 100\%}{x2} > 200\% \rightarrow \text{Result} = 200\%$ $\frac{x1 * 100\%}{x2} < -200\% \rightarrow \text{Result} = -200\%$							
Index:	See P2869							
Dependency:	P2802[10] assigns the Divider to the processing sequence.							
r2882	**CO: DIV 1**	-	-	-	-	-	Float	3
	Result of Divider 1.							
Dependency:	See P2881							
P2883[0...1]	**CI: DIV 2**	0 - 4294967295	0	U, T	4000H	-	U32	3
	Define inputs of Divider 2, result is in r2884.							
Index:	See P2869							
Dependency:	P2802[11] assigns the Divider to the processing sequence.							
r2884	**CO: DIV 2**	-	-	-	-	-	Float	3
	Result of Divider 2.							
Dependency:	See P2883							
P2885[0...1]	**CI: CMP 1**	0 - 4294967295	0	U, T	4000H	-	U32	3
	Defines inputs of Comparator 1, output is r2886.  $x1 \geq x2 \rightarrow \text{Out} = 1$ $x1 < x2 \rightarrow \text{Out} = 0$							
Index:	See P2869							
Dependency:	P2802[12] assigns the Comparator to the processing sequence.							
r2886.0	**BO: CMP 1**	-	-	-	-	-	Float	3
	Displays result bit of Comparator 1. See r2811 for the bit field description.							
Dependency:	See P2885							
P2887[0...1]	**CI: CMP 2**	0 - 4294967295	0	U, T	4000H	-	U32	3
	Defines inputs of Comparator 2, output is r2888.							
Index:	See P2869							
Dependency:	P2802[13] assigns the Comparator to the processing sequence.							
r2888.0	**BO: CMP 2**	-	-	-	-	-	U16	3
	Displays result bit of Comparator 2. See r2811 for the bit field description.							
Dependency:	See P2887							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P2889	**CO: Fixed setpoint 1 in [%]**	-200.00 - 200.00	0.00	U, T	-	-	Float	3
	Fixed percent setting 1.  							
P2890	**CO: Fixed setpoint 2 in [%]**	-200.00 - 200.00	0.00	U, T	-	-	Float	3
	Fixed percent setting 2.							
P2940	**BI: Release wobble function**	0 - 4294967295	0.0	T	-	-	U32	2
	Defines the source to release the wobble function.							
P2945	**Wobble signal frequency [Hz]**	0.001 - 10.000	1.000	T	-	-	Float	2
	Sets the frequency of the wobble signal.							
P2946	**Wobble signal amplitude [%]**	0.000 - 0.200	0.000	T	-	-	Float	2
	Sets the value for the amplitude of the wobble-signal as a proportion of the present ramp function generator (RFG) output. The value of P2946 is multiplied by the output value of the RFG then added to RFG output. For example, if the RFG output is 10 Hz, and P2946 has a value of 0.100, the wobble signal amplitude will be 0.100 * 10 = 1 Hz. This means that the RFG output will therefore wobble between 9 Hz and 11 Hz.							
P2947	**Wobble signal decrement step**	0.000 - 1.000	0.000	T	-	-	Float	2
	Sets the value for decrement step at the end of the positive signal period. The amplitude of the step is dependent upon the signal amplitude as follows: Amplitude of signal decrement step = P2947 * P2946							
P2948	**Wobble signal increment step**	0.000 - 1.000	0.000	T	-	-	Float	2
	Sets the value for the increment step at the end of the negative signal period. The amplitude of the increment step is dependent upon the signal amplitude as follows: Amplitude of signal increment step = P2948 * P2946							
P2949	**Wobble signal pulse width [%]**	0 - 100	50	T	-	-	U16	2
	Sets the relative widths of the rising and falling pulses. The value in P2949 sets the proportion of the wobble period (determined by P2945) allocated to the rising pulse, the remainder of the time is allocation to the falling pulse. A value of 60% in P2949 means that 60% of the wobble period the wobble output will be rising. For the remaining 40% of the wobble period the wobble output will be falling.							
r2955	**CO: Wobble signal output [%]**	-	-	-	-	-	Float	2
	Displays the output of the wobble function.							
r3113.0...15	**CO/BO: Fault bit array**	-	-	-	-	-	U16	1
	Gives information about actual fault.							

	Bit	Signal name	1 signal	0 signal
	00	Converter error	Yes	No
	01	Power line failure	Yes	No

Parameter	Function		Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
	02	Intermediate circuit power voltage				Yes		No	
	03	Error power electronics				Yes		No	
	04	Converter overtemperature				Yes		No	
	05	Earth leakage				Yes		No	
	06	Motor overload				Yes		No	
	07	Bus fault				Yes		No	
	09	Reserved				Yes		No	
	10	Fault internal communication				Yes		No	
	11	Motor current limit				Yes		No	
	12	Supply failure				Yes		No	
	13	Reserved				Yes		No	
	14	Reserved				Yes		No	
	15	Other error				Yes		No	
r3237[0...1]	**CO: Calculated rms DC ripple voltage [V]**		-	0	-	-	-	Float	4
	Displays calculated rms dc-link ripple voltage.								
Index:	[0]		Ripple Volts						
	[1]		Unfiltered Volts						
P3350[0...2]	**Super torque modes**		0 - 3	0	T	-	-	U16	2
	Selects the super torque function. Three different super torque modes are available: • Super Torque - applies a pulse of torque for a given time to help start the motor • Hammer Start - applies a sequence of torque pulses to help start the motor • Blockage Clearing - performs a reverse-forward operation to clear a pump blockage **Super Torque Operation:**  								

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
	Hammer Start Operation: 							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
	Blockage Clearing Operation:  							
	0	Super torque modes disabled						
	1	Super torque enabled						
	2	Hammer start enabled						
	3	Blockage clearing enabled						
Index:	[0]	Drive data set 0 (DDS0)						
	[1]	Drive data set 1 (DDS1)						
	[2]	Drive data set 2 (DDS2)						
Note:	When the value of P3350 is changed, the value of P3353 is changed as follows: • P3350 = 2: P3353 = 0.0s • P3350 ≠ 2: P3353 = default The ramp time of 0s gives an additional 'kicking' effect when hammer start is in use. This setting can be overridden by the operator. If blockage clearing mode is enabled (P3350 = 3), make sure that reverse direction is not inhibited, i.e. P1032 = P1110 = 0.							
P3351[0...2]	**BI: Super torque enable**	0 - 4294967295	0	T	-	CDS	U32	2
	Defines source of the super torque enable when P3352 = 2.							
Dependency:	Applies only when P3352 = 2.							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P3352[0...2]	**Super torque startup mode**	0 - 2	1	T	-	-	U16	2
	Defines when the super torque function becomes active.							
	0	Enabled on first run after power-up						
	1	Enabled on every run						
	2	Enabled by digital input						
Index:	See P3350							
Dependency:	If P3352 = 2, enable source is defined by P3351							
P3353[0...2]	**Super torque ramp time [s]**	0.0 - 650.0	5.0	T	-	-	Float	2
	Defines the ramp time to be used for all super torque functions. Overrides the P1120/P1060 when converter is ramping to super torque/hammer start frequency (P3354) or the blockage clearing frequency (P3361).							
Index:	See P3350							
Dependency:	The value of this parameter is changed by the setting of P3350. See the description of P3350.							
P3354[0...2]	**Super torque frequency [Hz]**	0.0 - 550.0	5.0	T	-	-	Float	2
	Defines the frequency at which the additional boost is applied for super torque and hammer start modes.							
Index:	See P3350							
P3355[0...2]	**Super torque boost level [%]**	0.0 - 200.0	150.0	T	PERCENT	-	Float	2
	The magnitude of the Super Torque boost is calculated as follows: V_ST = P0305 * Rsadj * (P3355/100) Note: Rsadj = stator resistance adjusted for temperature Rsadj = (r0395/100) * (P0304/(sqrt(3) * P0305)) * P0305 * sqrt(3)							
Index:	See P3350							
Dependency:	Up to 200% of rated motor current (P0305) or limit of converter.							
Note:	The Super Torque boost is calculated in the same way as Continuous Boost (P1310). As the stator resistance is used, the calculated voltage is only accurate at 0 Hz. Thereafter, it will vary in the same way as Continuous Boost. Setting in P0640 (motor overload factor [%]) limits the boost.							
P3356[0...2]	**Super torque boost time [s]**	0.0 - 20.0	5.0	T	-	-	Float	2
	Sets the time for which the additional boost will be applied, when the output frequency is held at P3354 Hz.							
Index:	See P3350							
P3357[0...2]	**Hammer start boost level [%]**	0.0 - 200.0	150.0	T	PERCENT	-	Float	2
	The magnitude of the Hammer Start boost is calculated as follows: V_HS = P0305 * Rsadj * (P3357/100) Note: Rsadj = stator resistance adjusted for temperature Rsadj = (r0395/100) * (P0304/(sqrt(3) * P0305)) * P0305 * sqrt(3)							
Index:	See P3350							
Dependency:	Up to 200% of rated motor current (P0305) or limit of converter.							
Note:	The Hammer Start boost is calculated in the same way as Continuous Boost (P1310). As the stator resistance is used, the calculated voltage is only accurate at 0Hz. Thereafter, it will vary in the same way as Continuous Boost. Setting in P0640 (motor overload factor [%]) limits the boost.							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P3358[0...2]	**Number of hammer cycles**	1 - 10	5	C, T	-	-	U16	2
	The number of times the hammer start boost level (P3357) is applied.							
Index:	See P3350							
P3359[0...2]	**Hammer on time [ms]**	0 - 1000	300	T	-	-	U16	2
	Time for which the additional boost is applied for each repetition.							
Index:	See P3350							
Dependency:	The time must be at least 3 x motor magnetization time (P0346).							
P3360[0...2]	**Hammer off Time [ms]**	0 - 1000	100	T	-	-	U16	2
	Time for which the additional boost is removed for each repetition.							
Index:	See P3350							
Note:	During this time, the boost level drops to the level defined by P1310 (continuous boost).							
P3361[0...2]	**Blockage clearing frequency [Hz]**	0.0 - 550.0	5.0	T	-	-	Float	2
	Defines the frequency at which the converter runs in the opposite direction to the setpoint during the blockage clearing reverse sequence.							
Index:	See P3350							
P3362[0...2]	**Blockage clearing reverse time [s]**	0.0 - 20.0	5.0	T	-	-	Float	2
	Sets the time for which the converter runs in the opposite direction to the setpoint during the reverse sequence.							
Index:	See P3350							
P3363[0...2]	**Enable rapid ramp**	0 - 1	0	T	-	-	U16	2
	Selects whether the converter ramps to, or starts directly from, the blockage clearing frequency (P3361).							
	0	Disable rapid ramp for blockage clearing						
	1	Enable rapid ramp for blockage clearing						
Index:	See P3350							
Note:	If P3363 = 1, the output jumps to the reverse frequency - this introduces a "kicking" effect which helps to clear the blockage.							
P3364[0...2]	**Number of blockage clearing cycles**	1 - 10	1	T	-	-	U16	2
	The number of times the blockage clearing reversing cycle is repeated.							
Index:	See P3350							
r3365	**CO/BO: Status word: super torque**	-	-	-	-	-	U16	2
	Shows the operational status of the Super Torque function, while active.							

	Bit	**Signal name**	**1 signal**	**0 signal**
	00	Super Torque Active	Yes	No
	01	Super Torque Ramping	Yes	No
	02	Super Torque Boost On	Yes	No
	03	Super Torque Boost Off	Yes	No
	04	Blockage Clearing Reverse On	Yes	No
	05	Blockage Clearing Reverse Off	Yes	No

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P3852[0...2]	**BI: Enable frost protection**	0 - 4294967295	0	U, T	-	CDS	U32	2
	Defines command source of protection enable command. If binary input is equal to one, then protection will be initiated. If converter is stopped and protection signal becomes active, protection measure is applied as follows: • If P3853 ≠ 0, frost protection is applied by applying the given frequency to the motor • If P3853 = 0, and P3854 ≠ 0, condensation protection is applied by applying the given current to the motor							
Note:	The protection function may be overridden under the following circumstances: • If converter is running and protection signal becomes active, signal is ignored • If converter is turning motor due to active protection signal and a RUN command is received, RUN command overrides frost signal • Issuing an OFF command while protection is active will stop the motor							
P3853[0...2]	**Frost protection frequency [Hz]**	0.00 - 550.00	5.00	U, T	-	DDS	Float	2
	The frequency applied to the motor when frost protection is active.							
Dependency:	See also P3852.							
P3854[0...2]	**Condensation protection current [%]**	0 - 250	100	U, T	-	DDS	U16	2
	The DC current (as a percentage of nominal current) which is applied to the motor when condensation protection is active.							
Dependency:	See also P3852.							
P3900	**End of quick commissioning**	0 - 3	0	C(1)	-	-	U16	1
	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.							
	0	No quick commissioning						
	1	End quick commissioning with factory reset						
	2	End quick commissioning						
	3	End quick commissioning and initiate motor data calculation						
Dependency:	Changeable only when P0010 = 1 (quick commissioning).							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
Note:	P3900 = 1: When setting 1 is selected, only the parameter settings carried out via the commissioning menu "Quick commissioning" are retained; all other parameter changes, including the I/O settings, are lost. Motor calculations are also performed. P3900 = 2: When setting 2 is selected, only those parameters, which depend on the parameters in the commissioning menu "Quick commissioning" (P0010 = 1) are calculated. The I/O settings are also reset to default and the motor calculations performed. P3900 = 3: When setting 3 is selected, only the motor and controller calculations are performed. Exiting quick commissioning with this setting saves time (for example, if only motor rating plate data have been changed). Calculates a variety of motor parameters, overwriting previous values. These include P0344 (motor weight), P0350 (stator resistance), P2000 (reference frequency), P2002 (reference current). When transferring P3900, the converter uses its processor to carry out internal calculations. Communications - both via USS as well as via the Fieldbus - are interrupted for the time that it takes to make these calculations. This can result in the following error messages at the connected SIMATIC S7 control (communications via Fieldbus): • Parameter fault 30 • Converter fault 70 • Converter fault 75							
r3930[0...4]	**Converter data version**	-	-	-	-	-	U16	3
	Displays the A5E number and the converter data versions.							
Index:	[0]	A5E 1st 4 digits						
	[1]	A5E 2nd 4 digits						
	[2]	Logistic Version						
	[3]	Fixed Data Version						
	[4]	Calib Data Version						
P3950	**Access of hidden parameters**	0 - 255	0	U, T	-	-	U16	4
	Accesses special parameters for development (expert only) and factory functionality (calibration parameter).							
r3954[0...12]	**CM info and GUI ID**	-	-	-	-	-	U16	4
	Used to classify firmware (only for SIEMENS internal purposes).							
Index:	[0]	CM label (increment/branch)						
	[1]	CM label (counter)						
	[2]	CM label						
	[3...10]	GUI ID						
	[11]	GUI ID major release						
	[12]	GUI ID minor release						
r3978	**BICO counter**	-	-	-	-	-	U32	4
	Counts the number of changed BICO links.							

Parameter	Function	Range	Factory default	Can be changed	Scaling	Data set	Data type	Acc. Level
P3981	**Reset active fault**	0 - 1	0	T	-	-	U16	4
	Resets active faults when changed from 0 to 1.							
	0	No fault reset						
	1	Reset fault						
Note:	See P0947 (last fault code) Automatically reset to 0.							
P3984	**Client telegram off time [ms]**	100 - 10000	1000	T	-	-	U16	3
	Defines time after which a fault will be generated (F73) if no telegram is received from the client.							
Dependency:	Setting 0 = watchdog disabled							
r3986[0...1]	**Number of parameters**	-	-	-	-	-	U16	4
	Number of parameters on the converter.							
Index:	[0]	Read only						
	[1]	Read & write						
r4000 - r4064	**Reserved**							
P7844	**Acceptance test, confirmation**	0 - 2	0	T	-	-	U16	3
	After an automatic download from the SD card at startup, this parameter will be automatically set to 1. Also a fault F395 will be set. With setting to P7844 = 0 you quit F395 and confirm the parameter settings. Setting this parameter to 2 is only possible if an automatic download has been performed at startup. In this case the download will be undone and the previously stored parameters will be enabled.							
	0	Acceptance test/confirmation OK						
	1	Acceptance test/confirmation is pending						
	2	Undo clone						
Note:	If no automatic download from the SD card has been performed during startup the setting 2 is not possible. If the clone file contains user defaults and the cloning at startup is rejected with P7844 = 2, parameters are set to the user defaults in the clone file instead of the previously saved values.							
P8458	**Clone control**	0 - 4	2	C, T	-	-	U16	3
	This parameter specifies whether a cloning at startup will be performed. The File clone00.bin will be used. If no SD card is inserted there will be a normal startup.							
	0	No startup cloning						
	1	Clone at startup once						
	2	Clone at startup always						
	3	Clone at startup once, except the motor data						
	4	Clone at startup always, except the motor data						
Note:	Default value is 2. After first cloning the parameter is set to 0. If an SD card is inserted without a valid file the converter will set a fault F61/F63/F64 which can only be cleared by a power-cycle. The fault is signaled by a flashing RUN LED (Commissioning). The SF LED is not activated. P8458 will not be changed by performing a factory reset.							
P8553	**Menu type**	0 - 1	0	U, T	-	-	U16	1
	Selects whether to have menus with no text or menus with some text on the BOP.							
	0	Menus with no text						
	1	Menus with some text						