SIEMENS

SIMOREG DC Master

6RA70 Series

Application

SIMOREG 1Q-device, braking to defined speed using reversing

Microprocessor-Based Converters from 6kW to 1900kW
for Variable-Speed DC Drives

Edition 01

NOTE

This application documentation does not purport to handle or take into account all of the equipment details or versions or to cover every conceivable operating situation or application.
If you require more detailed information, or if special problems occur, which are not handled in enough detail in this document, please contact your local Siemens office.

The contents of this application documentation are not part of an earlier or existing agreement or legal contract and neither do they change it. The actual purchase contract represents the complete liability of the A&D Variable-Speed Drives Group of Siemens AG. The warrant conditions, specified in the contract between the two parties, is the only warranty which will be accepted by the A&D Variable-Speed Drives Group. The warranty conditions specified in the contract are neither expanded nor changed by the information provided in this application documentation.

WARNING

These converters contain hazardous electrical voltages, hazardous rotating machinery (fans) and control rotating mechanical components (drives). Death, serious bodily injury or substantial damage to property will occur if the instructions in the relevant operating manuals are not observed.

Only qualified personnel who are thoroughly familiar with all safety notices contained in the operating instructions as well as erection, operating and maintenance instructions must be allowed to work on these devices.

Successful and safe operation of this equipment is dependent on careful transportation, proper storage and installation as well as correct operation and maintenance.

We have checked that the contents of this publication agree with the hardware and software described herein. Nonetheless, differences might exist and therefore we cannot guarantee that they are completely identical. The information given in this publication is reviewed at regular intervals and any corrections that might be necessary are made in the subsequent printings. Suggestions for improvement are welcome at all times.

0 Contents

1 Applications

Using this application note, it is possible to implement a braking function in a 1-Q SIMOREG. In comparison to the 4-Q Simoreg, where braking is performed automatically depending on the applied setpoint, the braking process is started using a binary signal and a reduced setpoint value.

NOTICE

The setpoint has to be positive. Negative values can not be used, because during the internal field reversing sequence, the actual speed value is inverted, and closed loop control would not be functional.

This Application Note is especially useful for drives, that do not need 4-Q functionality, but require braking to a defined speed > 0. (for example paper mills, operating mode change from “operation” to “crawl”).

ACTIVATION of Option S00 is required for this application.

The application is based on „direction of rotation reversal using field reversal“ described in operating manual section 9.18.1.

WARNING

Also make sure, the appropriate overvoltage protection is present.

(See Application Note „Simoreg as a field supply unit“, Section 5)

1.1 Function description

Using a binary signal, braking is initialized, requesting field reversal, and setting the main setpoint to the braking setpoint. According to section 9.18.1 the internal sequence for field reversal is initialized. The field is reversed, reducing the speed of the motor. Once the setpoint has been reached, a limit-value monitor resets the RS-flip flop initializing the sequence to establish the previous field state.
The braking setpoint stays active, until a reset signal is applied to the “brake to defined speed” storing RS-flip flop.

For example

Should the signal “braking to defined speed” be used to reset the RS-flip flop, an inverter has to be inserted and connected to U416.2 (RS-flip flop Reset).

This example is shown in the function diagram and highlighted in gray. If one of SIMOREG’s digital input’s is used, the inverted signal is provided by default, eliminating the need for an inverter.

The braking operation can be canceled any time (even when field reversal is active), by resetting this RS-flip flop.

To prevent the brake setpoint from exceeding the main setpoint, a limitter is used. The adjoining multiplexer is used to disable altering of the brake setpoint while braking is active.

(Contact function diagrams at the end of the document for details)

Please note that at the moment of field reversal, the armature current and field current are 0.
The hysteresis (U 188) has to be set according to system specification.
The hysteresis value depends on inertia, drive friction, etc. .If this is not taken into account, the drives speed is reduced below the setpoint, therefore accelerating again to reach the appropriate speed once the original field direction is present. The hysteresis (U 188) should be set to a value for the limiter to react in advance. If the brake setpoint reaches the hysteresis of the actual value prior to braking, the signal “brake to defined speed” is blocked, and field reversal is not performed.

Also make sure, that the function blocks of option S00 are enabled and processed in correct order. Contact SIMOREG DC MASTER operating instructions Section 11.79,11.81 and 11.82 for details.

The processing sequence has to be maintained according to the following list:

Limit-value monitor	block	70	
Inverter	block	180	
(Inverter	block	181	OPTIONAL)
AND	block	120	
RS-flip-flop	block	216	
Limiter	block	65	
Multiplexer	block	86	
OR	block	150	
Timer(pulse generator)	block	240	
RS-flip-flop	block	215	
Connector changeover switch	block	90	

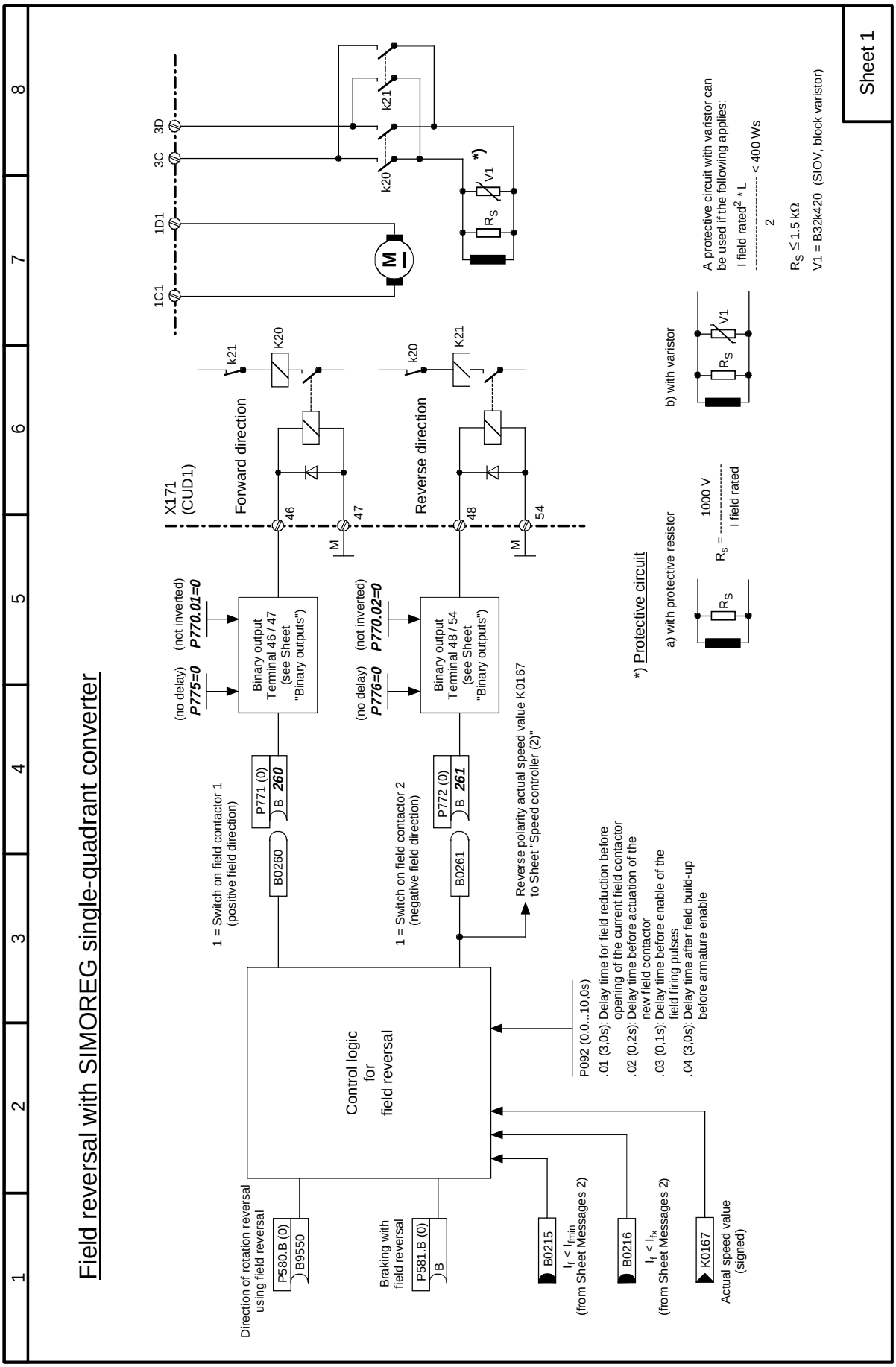
Sampling times have to be set using parameters U950,U951 and U952 according to SIMOREG Operating Manual. By default, sampling time for all of the freely assignable function blocks used in this application note is set to 1.

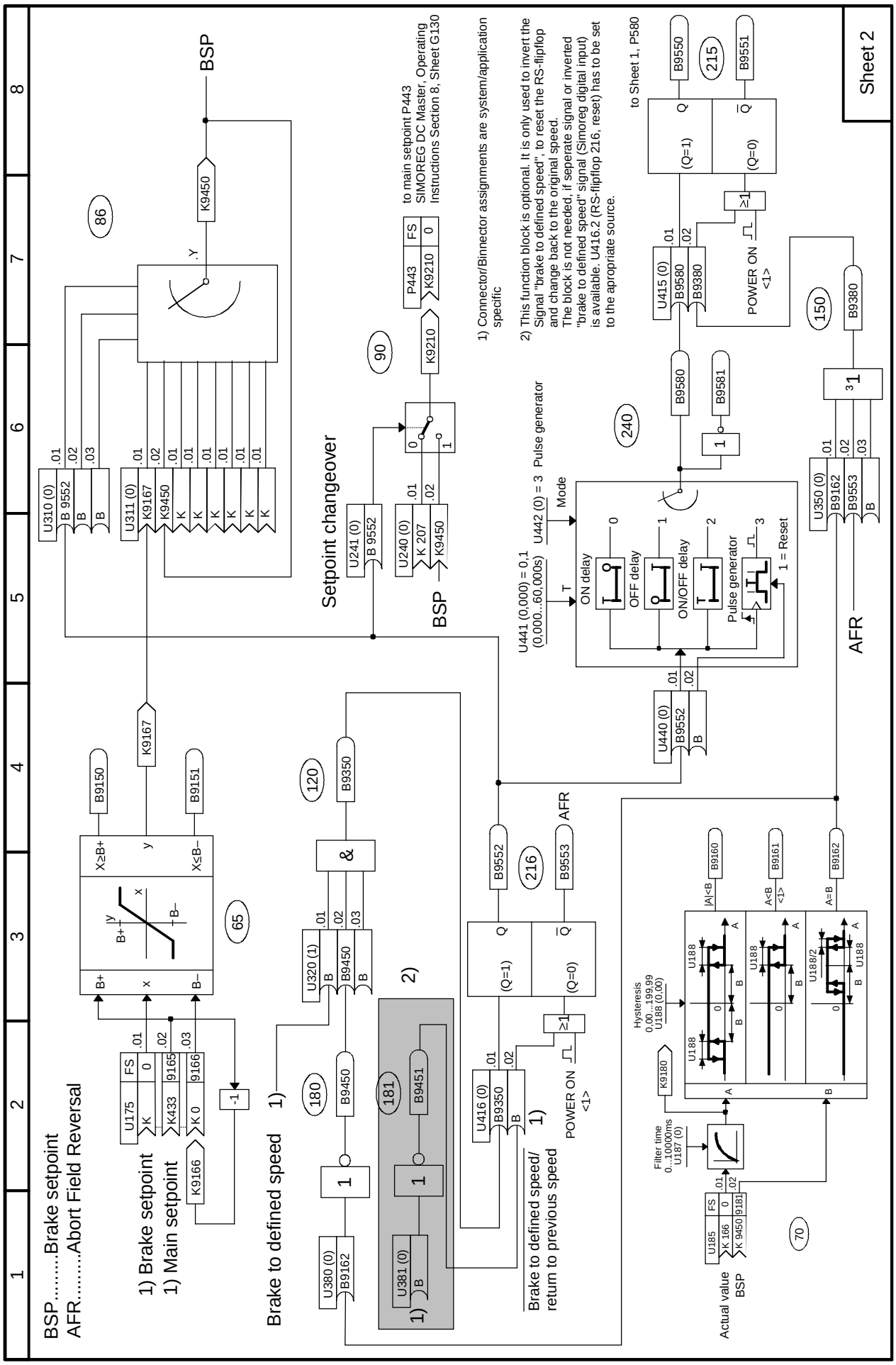
2 Parameter list

Parameter	Description	Value
U175.1	Source for input signal limiter 1	Braking setpoint source
U175.2	Positive limit limiter 1	Main setpoint
U175.3	Negative limit limiter 1	0
U310.1	Source for control bits for the multiplexer; is used for freezing the braking setpoint during braking operation.	Source of „Brake“ signal
U311.1	Multiplexer input 1	K9167 value of limited brake setpoint
U311.2	Multiplexer input 2	K9450 value of Multiplexer output for setpoint freezing
U380	Inverter for signal from limit-value monitor	B9162 limit-value monitor output (A=B)
U320.1	And – input 1	Signal “brake to defined speed”. Source according to system specification (for example Digitalinput, or Profibus,...)
U320.2	And – input 2	B9450 inverter output
U416.1	RS-flip-flop set	B9350 And output
U416.2	RS-flip-flop reset	System specific; see description for details.
U241	Connector changeover switch; source for control signal	Source of „Brake“ signal
U240.1	Connector changeover switch; Source 1	Source of main setpoint (for example K207)
U240.2	Connector changeover switch; Source 2	K9450 braking setpoint
P443	Source of main setpoint	K9210 output of connector changeover switch
U185.1	Limit-value monitors with filtering, Source signal A	K166 actual speed value (absolute value)
U185.2	Limit-value monitors with filtering, Source signal B	K9450 multiplexer output
U188	Hysteresis setting	Setting according to system specifications
U440.1	Timer source; set pulse generation for RS-flip-flop (block 215) field reversal	B9552 RS-flip-flop output (block 216)
U441	Time for timer 1 (length of pulse)	0,1->100ms
U442	Mode of timer 1	3 = pulse generation
U415.1	Source of RS-flip flop Set signal	B9580 TIMER 1 output
U415.2	Source of RS-flip flop Reset signal	B9380 OR 1 output
U350.1	OR 1 Source 1	B9162 limit-value monitor output
U350.2	OR 1 Source 2	B9553 RS-flip-flop (block 216) inverted output

Parameter	Description	Value
U977	Enable option S00	PIN-Number (Contact Operating Manual section 11.82)
n978	„S00 enabled“ display	
U960	S00 execution sequence	Index 1 = 70 (Limit-value monitor) Index 2 = 180 (Inverter) Index 3 = 120 (And) Index 4 = 216 (RS-flip flop) Index 5 = 65 (limiter) Index 6 = 86 (Multiplexer) Index 7 = 150 (Or) Index 8 = 240 (Timer) Index 9 = 215 (RS-flip flop) Index 10 =90 (Connector changeovr. sw.)
U950-U952	Sampling time settings for the freely assignable function blocks. (Contact Simoreg operating manual section 11.79 for details)	All function bolocks used in this Application Note, have to be processed in time slice No. 1.

3 Function diagrams





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