AMK AMKASYN

VARIABLE SPEED DRIVES

Application memo No. AP 2002 / 50

Publication date: 11.12.02

Author: S. Leimer

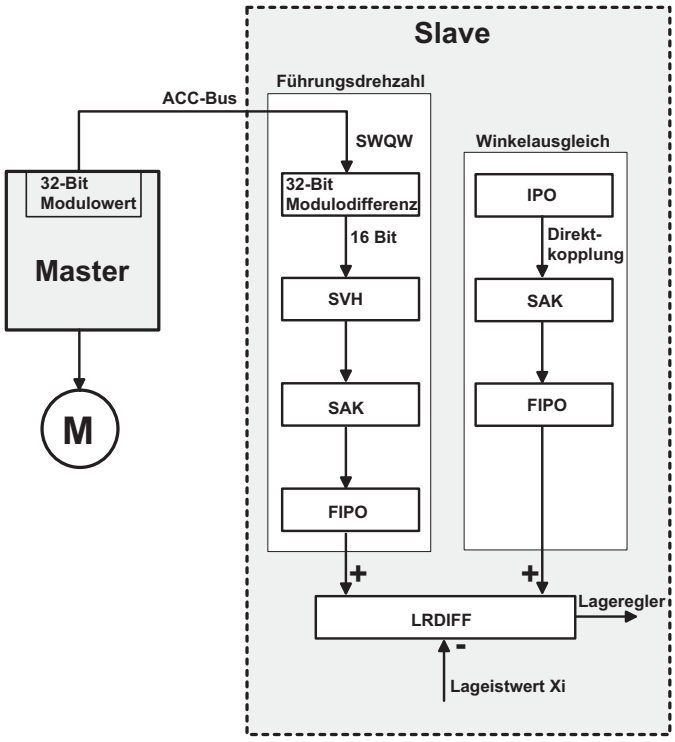
Subject to technical changes

Synchronization control with angle alignment by ACC

as of software KW-R02 02/44

The synchronization master sends a 32bit guide value (position setpoint) in modulo format via ACC to the synchronization slave. This is processed in the slave in a **new 32bit setpoint source SWQW**. An angle alignment with 32bit position setpoints in modulo format is only possible by the new SWQW setpoint channel. For that a CAN message is needed from the synchronization master to the synchronization slave.

Fig. 1 Signal flow during synchronous operation with angle alignment in modulo operation



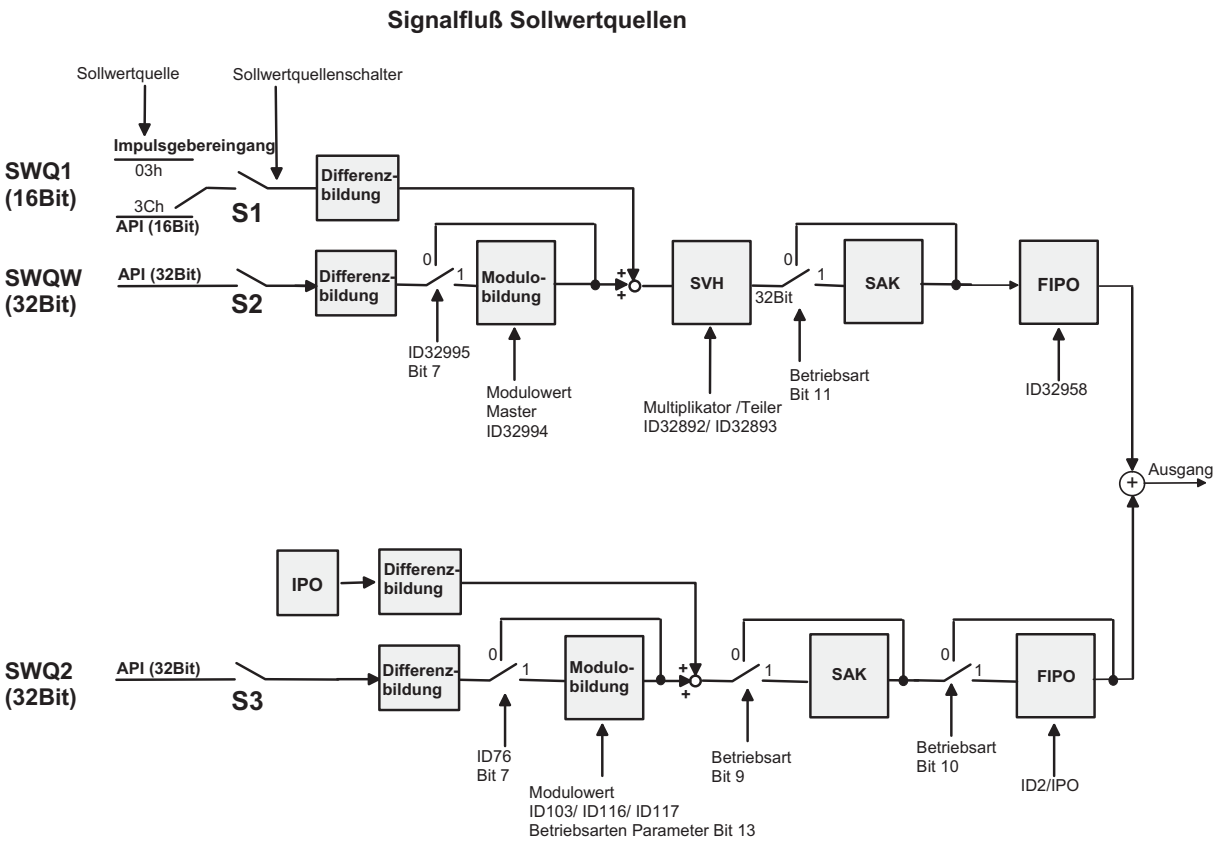
SPR: Set point ratio
TEC: Tracking error compensation
FIPO: Fine interpolator

The SWQ1 (previous 16bit setpoint source) permits the angle alignment via the pulse encoder interface as hitherto. Incoming pulses are internally interpolated 4 times.

In both options the synchronization ratio can be set with ID32892 “Setpoint multiplier”/ ID32893 “Setpoint divider”. The tracking error compensation is activated by the operating mode parameter ID32804/ ID32805 bit11. The cycle time of the fine interpolator for the SWQ1 and SWQW is set in ID32958 “SWQ1 cycle time"”

It is preconditioned that the master has been referenced before the slave is synchronized on. During referencing the modulo actual position value is zeroised. By transferring the master modulo actual position value to the slave, the master home position is known in the slave and the slave home position signal can be aligned to the master home position.

Fig. 2 Overview setpoint channels



The setting of the setpoint source in the operating mode parameter ID32800…ID32805 defines the switch setting S1…S3.

You have the following options:

Code (hex) SWQ	Operating mode	Setpoint source	SWQ1 16Bit (S1)	SWQW 32Bit (S2)	SWQ2 32Bit (S3)
1h	T, Sp	Analogue input A1 (A1I, A1N)			
14h	T, Sp, P, Sy	Setpoint of extended function			
40 (old: 3)	Sp?, P, Sy	Pulse encoder input	1	0	0
41 (old: 3C)	T, Sp, P, Sy	Command interface (API)	1	0	1
42		SWQ1+SWQW active	1	1	0
43		SWQ1+SWQW+SWQ2 active	1	1	1
44		No source (only IPO)	0	0	0
45		SWQ	0	0	1
46		SWQW active	0	1	0
47		SWQW+SWQ2 active	0	1	1

T: Torque control
Sp: Speed regulation
P: Position control
Sy: Synchronization control
IPO: Internal interpolator
API: Application interface

The “old” codes 03h and 3Ch are kept for compatibility reasons.

CAN configuration

The axes involved in the synchronization control need to be connected to the ACC Bus.
To transfer the position guide values of the synchronization master by ACC a synchronous PDO needs to be configured.

The “Mapping” entry in the send PDO of the master can be the API variable “actual_32bit_message”. This configuration transfers the configured 32bit value to ID32786 “signal 32”.

Example: ID32786=32899 (Actual position value Xi_2π (modulo))

For the synchronization slave a receiving PDO with the “mapping” entry “additiv_set_point” needs to be defined.

With this configuration the 32bit actual position value of the master is transferred by ACC to the slave and written into the setpoint source SWQW.

Overview of all relevant parameters:

Synchronization master

ID32786 Signal 32 =32899	Actual position value Xi_2π (modulo) depends on set actual position value system, see Operating mode ID32800…bit13 **Possible options:** ID116 Resolution motor encoder ID117 Resolution external encoder ID103 Modulo value

Synchronization slave

ID32994 Modulo value synchron-master	= modulo value from synchronization master
ID32995 Operating mode setpoint source 1	= bit 7=1 (80h modulo value formation ON)
ID32804 AMK NBA 4	= synchronous operating mode 4 (e.g. 460C04h)
or	
ID32805 AMK NBA 5	= synchronous operating mode 5 (e.g. 460C04h) 460C04:= position control with TEC and setpoint source SWQW
ID32958 Setpoint source 1 cycle time	= Cycle time for the scanning of the 16bit position setpoints