Overview drive controllers

Items to compare	AMKASYN - Servo drives										AMKASMART - Decentralized drives			
	KE/KW Controller cards KW-Rxx									KWZ				
Encoder evaluation	**R27**	**R26**	**R25**	**R24-R**	**R24**	**R16 R17**	**R05 R06 R07**	**R04**	**R03 R03P**	**KWZ**	**ihXT**	**iDT(-R3) iX(-R3) iC(-R3)**	**iDT iX iC**	**iDT4**
Resolver (R-encoder)	-	-	-	■	-	-	■	■	■	■	-	-	-	-
Sine encoder (I-encoder)	■	■	■	-	-	■	■	-	■	-	■	■ 24)	■ 24)	-
Absolute encoder (B-/C-encoder)	-	-	-	-	-	-	-	-	-	-	-	-	-	■ 7)
EnDat 2.1 (E-/F-encoder)	■	■	■	-	-	■	■	-	■	-	■	■	■	-
Hiperface (S-/T-type)	■	■	■	-	-	■	■	-	■	-	■	■	■	-
Hiperface (U-/V-encoder)	■	■	■	-	-	■	■	-	-	-	■	■	■	-
Hiperface DSL (Y-encoder)	■	■	-	-	-	-	-	-	-	-	-	-	-	-
EnDat 2.2 light (P-/Q-encoder)	■ 20)	■ 20)	■ 20)	-	-	■ 20)	■ 20)	-	-	-	■	■ 20)	■ 20)	-
Hall sensor (H-encoder)	-	-	-	-	-	-	■ 30)	-	■ 30)	-	-	■ 31)	■ 31)	-
Square wave pulse interface (input / forward) 1)	-	-	-	-	-	-	■ 2)	■ 2)	■ 2)	-	-	-	-	■ 3)
2nd encoder e.g. load encoder	-	-	-	-	-	-	■	■ 21)	■	-	-	-	-	-

I/O interface	R27	R26	R25	R24-R	R24	R16 R17	R05 R06 R07	R04	R03 R03P	KWZ	ihXT	iDT(-R3) iX(-R3) iC(-R3)	iDT iX iC	iDT4
Analog input ±10V (resolution)	-	-	-	-	-	2 12 Bit	2 12 Bit	2 12 Bit	2 12 Bit	1 12 Bit	-	1 12 Bit	1 12 Bit	1 10 Bit [4)]
Analog output	-	-	-	-	-	-	-	Option [9)]	Option [9)]	-	-	-	-	-
Local digital inputs	■ [32)]	■ [32)]	■ [32)]	■ [32)]	■ [32)]	3	3	3	3	3	-	■ [22)]	■ [22)]	3 [4)]
Local digital output	■ [32)]	■ [32)]	■ [32)]	■ [32)]	■ [32)]	3	3	3	3	3	-	■ [22)]	■ [22)]	1
Square wave pulse interface output (SIWL) f_{max}	-	-	-	-	-	-	2 MHz	500 kHz	500 kHz	-	-	-	-	-

Option cards	R27	R26	R25	R24-R	R24	R16 R17	R05 R06 R07	R04	R03 R03P	KWZ	ihXT	iDT(-R3) iX(-R3) iC(-R3)	iDT iX iC	iDT4
No. of option card slots	-	-	-	-	-	-	1	-	2	-	-	-	-	-
KW-EA2	-	-	-	-	-	-	■	-	■	-	-	-	-	-
KW-PLC2	-	-	-	-	-	-	-	-	■	-	-	-	-	-
KW-PLC1 [8)]	-	-	-	-	-	-	-	-	■	-	-	-	-	-
KW-PB1	-	-	-	-	-	-	-	-	■	-	-	-	-	-
KW-PB2	-	-	-	-	-	-	-	-	■	-	-	-	-	-
KW-EC1	-	-	-	-	-	-	-	-	■	-	-	-	-	-
KW-EN1	-	-	-	-	-	-	-	-	■	-	-	-	-	-
KW-SC1	-	-	-	-	-	-	-	-	■	-	-	-	-	-
KW-PIW	-	-	-	-	-	-	-	-	■	-	-	-	-	-
KW-ARC	-	-	-	-	-	-	-	-	■	-	-	-	-	-
KW-SSI	-	-	-	-	-	-	-	-	■	-	-	-	-	-

Drive controller with cyclic setpoint processing via PLC or real-time bus	**R27**	**R26**	**R25**	**R24-R**	**R24**	**R16 R17**	**R05 R06 R07**	**R04**	**R03 R03P**	**KWZ**	**ihXT**	**iDT(-R3) iX(-R3) iC(-R3)**	**iDT iX iC**	**iDT4**
Position control	■	■	■	■	-	■	■	■	■	■	■	■	■	■
Speed control	■	■	■	■	■ 36)	■	■	■	■	■	■	■	■	■
Torque control	■	■	■	■	■ 36)	■	■	■	■	■	■	■	■	■
PLC functionality	ext. 15)	ext. 15)	ext. 15)	Extern 15)	ext. 15)	ext. 15)	ext. 15)	ext. 15)	ext. 15) integr. 26)	ext. 15)	ext. 15)	ext. 15)	ext. 15)	ext. 15)
Setpoint feed-forward	■	■	■	■	■	■	■	■	■	■	■	■	■	■

Communication interfaces (Fieldbus)	R27	R26	R25	R24-R	R24	R16 R17	R05 R06 R07	R04	R03 R03P	KWZ	ihXT	iDT(-R3) iX(-R3) iC(-R3)	iDT iX iC	iDT4
EtherCAT (SoE) [18)]	Slave	Slave	Slave	Slave	Slave	Slave	Slave	-	KW-EC1 [14)]	Slave	Slave	Slave	Slave	-
EtherCAT (CoE) DS 402	Slave	Slave	Slave	Slave	Slave	-	-	-	-	-	Slave	Slave	from V1.06	-
EtherCAT (EoE)	Slave	Slave	Slave	Slave	Slave	-	-	-	-	-	Slave	Slave	-	-
EtherCAT (FoE)	Slave	Slave	Slave	Slave	Slave	Slave	Slave	-	-	-	Slave	Slave	Slave	-
VARAN (SoV)	Slave	Slave	Slave	Slave	Slave	Slave	Slave	-	-	-	Slave	Slave	-	-
VARAN (EoV)	Slave	Slave	Slave	Slave	Slave	-	-	-	-	-	-	Slave	-	-
VARAN (FoV)	Slave	Slave	Slave	Slave	Slave	Slave	Slave	-	-	-	-	Slave	-	-
CAN ACC Bus [17)]	-	-	-	-	-	-	Master	■	■	Slave	-	-	-	Slave
CAN CiA DS 301 [17)]	-	-	-	-	-	-	Master	■	■	Slave	-	-	-	Slave
CAN CiA DS402 [17)]	-	-	-	-	-	-	-	-	-	-	-	-	■ [29)]	-
Profibus DP	-	-	-	-	-	-	-	-	KW-PB1 [14)]	-	-	-	-	-
Profibus DP V2									KW-PB2 [14)]					
SERCOS II	-	-	-	-	-	-	-	-	KW-SC1 [14)]	-	-	-	-	-
SERCOS III	-	-	-	-	-	-	-	-	-	-	-	■ [29)]	■ [29)]	-
RS232	-	-	-	-	-	-	-	■ [16)]	■ [16)]	■ [16)]	-	-	-	-
RS422	-	-	-	-	-	-	-	-	■ [13)]	-	-	-	-	-
RS485	-	-	-	-	-	-	-	-	■ [13)]	-	-	-	-	■ [5)]
USB 1.1	■	■	■	■	■	■	■	-	-	-	■	■	-	-

Drive functions (commands supported by firmware)	R27	R26	R25	R24-R	R24	R16 R17	R05 R06 R07	R04	R03 R03P	KWZ	ihXT	iDT(-R3) iX(-R3) iC(-R3)	iDT iX iC	iDT4
AFP commanding	-	-	-	-	-	-	-	■	■	for variant ACC	-	-	-	■
Probe function (actual position encoder)	■	■	■	■	-	■	■	■	■	■ [19)]	-	■	■	■
Probe function (square wave pulse encoder)	-	-	-	-	-	-	■	■	■	-	-	-	-	-
Number of probe function according SERCOS	2	2	2	-	-	2	2	1	1	-	2 [28)]	2 [28)]	2 [28)]	-
Homing cycle with / without cam and zero pulse	■	■	■	■	-	■	■	■	■	■	■ [33)]	■	■	■
Homing cycle to fixed stop	■	■	■	■	-	■	■	■	■	■	■	■	■	■
Homing while initialization	■	■	■	■	-	■	■	-	-	-	■	■	■	■
Spindle positioning	-	-	-	-	-	-	-	■	■	-	-	-	-	-
Operation mode change	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Parameter set change	■	■	■	■	■	■	■	■	■	-	■	■	■	-
Digital speed control (ID36)	■	■	■	■	■ [36)]	■	■	■	■	■	■	■	■	■
Analog speed control	-	-	-	-	-	■	■	■	■	■	-	■	■	■
Digital torque control (ID80)	■	■	■	■	■ [36)]	■	■	■	■	■	■	■	■	■
Analog torque control	-	-	-	-	-	■	■	■	■	■	-	■	■	-

Drive functions (commands supported by firmware)	R27	R26	R25	R24-R	R24	R16 R17	R05 R06 R07	R04	R03 R03P	KWZ	ihXT	iDT(-R3) iX(-R3) iC(-R3)	iDT iX iC	iDT4
Positioning relative	- [23]	- [23]	- [23]	- [23]	-	- [23]	- [23]	■	■	■	- [23]	- [23]	- [23]	■
Positioning absolute	- [23]	- [23]	- [23]	- [23]	-	- [23]	- [23]	■	■	■	- [23]	- [23]	- [23]	■
System booting	■ [28]	■ [28]	■ [28]	■ [28]	■ [28]	■	■	■	■	■	■	■ [28]	■ [28]	■
System reset	-	-	-	-	-	-	-	■	■	■	-	-	-	■
Initial loading	■	■	■	■	■	■	■	■	■	■	■	■ [28]	■ [28]	■
Function generator in AIPEX PRO	■	■	■	■	■	■	■	■	■	-	■	■ [28]	■ [28]	■

Additional functions in the drive controller	R27	R26	R25	R24-R	R24	R16 R17	R05 R06 R07	R04	R03 R03P	KWZ	ihXT	iDT(-R3) iX(-R3) iC(-R3)	iDT iX iC	iDT4
Motor brake control	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Electronic gear via parameters ID32893/ID32892	-	-	-	-	-	-	-	■	■	■	-	-	-	■
Scaling	■	■	■	■	■	-	-	■	■	-	■	■	-	-
Temperature model	■	■	■	■	■	■	■	■ 12)	■ 12)	-	■	■	■	-
KTY monitoring	■	■	■	■	■	■	■	■	■	-	■	■	■	-
Position setpoint filter	■	■	■	■	-	■	■	-	-	-	■	■	■	-
Cyclic filter	■	■	■	■	■	■	■	-	-	-	■	■	■	-
Load model	■	■	■	■	■	■	■	-	-	-	■	■	■	-
V/f-operation mode without encoder	■	■	■	■	■	■	■	■	■	■	-	■	■	-
Sensorless control	■	■	■	■	■			-	-	-	-	-	-	-
i^2t monitoring external components	■	■	■	■	■	■	■	-	-	-	■	■	■	-
Braking at encoder failure for synchronous motors (dynamic braking)	■	■	■	■	-	■	■	-	-	-	■	■ 35)	■ 35)	-

Cycle times	R27	R26	R25	R24-R	R24	R16 R17	R05 R06 R07	R04	R03 R03P	KWZ	ihXT	iDT(-R3) iX(-R3) iC(-R3)	iDT iX iC	iDT4
min. bus cycle time	500 µs	500 µs	500 µs	500 µs	500 µs	500 µs	500 µs	500 µs	500 µs	1 ms	500 µs	1 ms	1 ms	500 µs
Current controller	62,5 µs	62,5 µs	62,5 µs	62,5 µs	62,5 µs	62,5 µs	62,5 µs	125 µs	125 µs	125 µs	62,5 µs	62,5 µs	62,5 µs	62,5 µs
Torque control	62,5 µs	62,5 µs	62,5 µs	62,5 µs	62,5 µs	62,5 µs	62,5 µs	125 µs	125 µs	125 µs	62,5 µs	62,5 µs	62,5 µs	62,5 µs
Speed controller	125 µs	125 µs	125 µs	125 µs	125 µs	125 µs	125 µs	125 µs	125 µs	500 µs	125 µs	125 µs	125 µs	62,5 µs
Position controller	250 µs	250 µs	250 µs	250 µs	-	250 µs	250 µs	500 µs	500 µs	1 ms	250 µs	250 µs	250 µs	500 µs
CAM input BE3	1 ms	1 ms	1 ms	1 ms	-	1 ms	1 ms	1 ms	1 ms	1 ms	-	1 ms	1 ms	1 ms
AFP commanding interface	-	-	-	-	-	-	-	5 ms	5 ms	5 ms	-	-	-	5 ms
Interpolator	1 ms	1 ms	1 ms	1 ms	-	1 ms	1 ms	5 ms	5 ms	1 ms	1 ms	1 ms	1 ms	1 ms
Analog inputs	-	-	-	-	-	250 µs	250 µs	250 µs	250 µs	125 µs	-	250 µs	250 µs	1 ms
Analog outputs [11)]	-	-	-	-	-	-	-	1 ms	1 ms	-	-	-	-	-
Digital inputs	1 ms	1 ms	1 ms	1 ms	1 ms	1 ms	1 ms	1 ms	1 ms	1 ms	1ms [34)]	1 ms	1 ms	1 ms
Digital outputs	1 ms	1 ms	1 ms	1 ms	1 ms	1 ms	1 ms	1 ms	1 ms	1 ms	1ms [34)]	1 ms	1 ms	1 ms

Safety functions	R27	R26	R25	R24-R	R24	R17	R07	R05 R06 R16	R03 R03P R04	KWZ	ihXT	iDT(-R3) iX(-R3) iC(-R3)	iDT iX iC	iDT4
Protection against restart (EF logic) EN 954-1 EN ISO 13849-1	■ [10)] Cat. 4 PLe	■ [10)] Cat. 4 PLe	■ [10)] Cat. 4 PLe	■ [10)] Cat. 4 PLe	■ [10)] Cat. 4 PLe	■ [10)] Cat. 4 PLe	■ [10)] Cat. 4 PLe	■ [10)] Cat. 4 PLe	■ [10)] Cat. 4 PLe	■ [10)] Cat. 4 PLe	-	-	-	-
Safe Torque Off 'STO' EN ISO 13849-1 (STO supply inputs on the device)	-	-	-	-	-	-	-	-	-	-	■ Cat. 3 PLd SIL2	■ Cat. 3 PLd SIL2	■ Cat. 3 PLd SIL2	-
Functional safety (STO) (FSoE or if available via safe inputs)	■ Cat. 4 PLe SIL3	-	-	-	-	■ Cat. 4 PLe SIL3	■ Cat. 4 PLe SIL3	-	-	-	-	■ Cat. 4 PLe SIL3	■ Cat. 4 PLe SIL3	-
Functional safety (SS1, SS2, SOS, SMS, SSR, SLS, SDI, SLI) (FSoE or if available via safe inputs)	■ Cat. 3 PLd SIL2	-	-	-	-	■ Cat. 3 PLd SIL2	■ Cat. 4 PLe SIL3	-	-	-	-	■ Cat. 3 PLd SIL2	■ Cat. 3 PLd SIL2	-

Visualization	R27	R26	R25	R24-R	R24	R16 R17	R05 R06 R07	R04	R03 R03P	KWZ	ihXT	iDT(-R3) iX(-R3) iC(-R3)	iDT iX iC	iDT4
External	-	-	-	-	-	-	-	-	Modbus [26)]	-	-	-	-	-
Handheld KU-BF1	-	-	-	-	-	-	-	■	■	■	-	-	-	-

Service	R27	R26	R25	R24-R	R24	R16 R17	R05 R06 R07	R04	R03 R03P	KWZ	ihXT	iDT(-R3) iX(-R) iC(-R3)	iDT iX iC	iDT4
AIPEX PRO connections	USB or RTE	USB or RTE	USB or RTE	USB or RTE	USB or RTE	USB or Ether CAT 27)	USB or Ether CAT 27)	RS232 / ACC	RS232 / ACC	RS232 / ACC	USB or RTE27)	RTE 27)	Ether CAT 27) DS402	ACC
Firmware update	USB or RTE	USB or RTE	USB or RTE	USB or RTE	USB or RTE	USB or Ether CAT 27)	USB or Ether CAT 27)	RS232	RS232	RS232	USB or RTE 27)	RTE 27)	Ether CAT 27) DS402	ACC

i.p. in preparation
RTE Real-time Ethernet
SM Synchronous machine
1) The square wave pulse interface can alternatively be parameterized as input or to forward the signals
2) 5 V level track A and B differential
3) 24 V level track A and B, only signal input, no pulse transmission
4) Analog inputs, square wave inputs, 2 local inputs can be parameterized alternatively, non-isolated
5) Commanding via Modbus
6) Without sine or cosine track
7) 1 period/revolution accuracy like resolver , B-singleturn, C-multiturn, UPS-for absolute position
8) Not for new applications
9) KW-SM1 3 outputs at maximum
10) Only available if the device has the 2-channel EF logic (enable final power output stage)
11) 1 analog output per ms. If 3 analog outputs are used the cycle time will be 3 ms
12) Effective in KW and KWD modules, not supported in KU
13) Interface for Modbus available on the option card KW-PLC2
14) Available as option with slave functionality
15) The control can be done via real-time bus
16) Connector for handheld or for PC to the software AIPEX or CoDeSys
17) CANopen: ACC CAN with additional hardware synchronization impulse signal, DS 301 V4.01 Communication Profile, DS 402 Device Profile
18) SoE: Servodrive profile according IEC 61800-7-300 via EtherCAT (SoE)
19) Is one drive operating in the mode “sensorless”, the probe function for both drives is disabled
20) Only the digital track is evaluated.
EnDat 2.2 light means, that the encoder supports EnDat 2.2, which is used only with the commands of EnDat 2.1 from the AMK controller.
21) Only square wave pulse encoder input, no sine wave encoder
22) A total of 5 non-isolated parametrizable in- and outputs: max. 5 binary inputs, max. 3 binary outputs, max. 1 analog input
23) Relative and absolute positioning profiles must be generated and interpolated by the PLC controller and must be sent to the drive position controller as cyclic setpoint

24) Encoder interface with external hardware support (Level adaption circuit for sine/cosine to 1.2 V peak-peak
25) Homing cycle to cam without zero pulse, homing cycle against a fixed stop
26) Only for KW-R03P
27) Firmware update central by the EtherCAT FoE (File over EtherCAT] interface protocol (required: AIPEX PRO 1.7)
28) The functionality must be realized by the external controller via SoE protocol
29) Slave with AMK specific function range
30) Connection via resolver input X130 connector 8: GND, connector 9: 5 VDC
31) Connection via sine encoder input
32) The controller card supports 3 multifunctional BI/O (BI/O1 to 3). Each BI/O can be used either as binary input or binary output.
33) The cam signal must be written to ID400 'Home switch' via bus.
34) Digital inputs and digital outputs as virtual I/O's can be read or written via bus.
35) This function is not allowed to use for motors with E- or F-encoders for this firmware!
36) Sensorless operation without encoder; digital speed control and digital torque control with setpoint source 0x43

Changes to the version 2022/48:

- B-/C-type encoder was missing