

This interface description is not binding and may differ depending on the individual application.

1. EtherCAT interface between screwdriver control and higher order control (MMI)

- Input signals screwdriver control
- Output signals screwdriver control
- EtherCAT connection

1.1 Input signals

1.1.1 Start screwdriver

	Function	EtherCAT	Format
Start	eStart	X	0/1

Starts the screwing sequence

The screwing sequence can be started when

- automatic mode is selected.
- no faults are active.
- a valid screwing program was selected with the program selection.
- the screwdriver is loaded or unloaded in accordance with the selected screwing program.

1.1.2 Program selection

	Function	EtherCAT	Format	
Program selection Bit 0	eProgBit0	X	0/1	PG no. +1
Program selection Bit 1	eProgBit1	X	0/1	PG no. +2
Program selection Bit 2	eProgBit2	X	0/1	PG no. +4
Program selection Bit 3	eProgBit3	X	0/1	PG no. +8
Program selection Bit 4	eProgBit4	X	0/1	PG no. +16
Program selection Bit 5	eProgBit5	X	0/1	PG no. +32
Program selection Bit 6	eProgBit6	X	0/1	PG no. +64

eProgBit0 ... eProgBit3 or eProgBit6 pre-selects the screwing program for the next screwing cycle in binary form.

A program number < 1 or > 50 is invalid.

1.1.3 Screw selection

	Function	EtherCAT	Format	
Screw selection Bit 0	eVeBit0	X	0/1	VE no. +1
Screw selection Bit 1	eVeBit1	X	0/1	VE no. +2
Screw selection Bit 2	eVeBit2	X	0/1	VE no. +4

eVeBit0 ... eVeBit2 selects the screw for the next process "Marshalling" in binary form.

1.1.4 Acknowledge fault

	Function	EtherCAT	Format
Acknowledge fault	eAckStoer	X	0/1

1.1.5 Request home position

	Function	EtherCAT	Format
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Request home position	eGstAnf	X	0/1
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1.1.6 Programmable Customer Input

	Function	EtherCAT	Format	available
KDE1	eKde1	X	0/1	≥ 1.28

eKde1 is connected to the command WAIT E in the screw driving program.

1.2 Output signals

1.2.1 Fault

	Function	EtherCAT	Format
Fault	aStoer	X	0/1

aStoer is switched on when there is a fault on the screwdriver.

As soon as the fault has been eliminated, the output is switched off.

1.2.2 Home position

	Function	EtherCAT	Format
Home position	aGst	X	0/1

aGst is switched on when

- The strokes of the screwdriver have reached the pre-defined position in which it is itself at right angles to the work piece (robot, positioning system) or
- the work piece can be moved at right angles to the screwdriver (production line with work piece carriers).

1.2.3 Ready

	Function	EtherCAT	Format
Ready	aSb	X	0/1

aSb is switched on when the screwdriver can be started by switching on the customer's input eStart.

1.2.4 OK

	Function	EtherCAT	Format
OK	aIO	X	0/1

aIO is

- switched off as soon as the screwing process is started.
- switched on again when the screwing process is ended and the screw connection is OK.

1.2.5 NOK

	Function	EtherCAT	Format
NOK	aNIO	X	0/1

aNIO is

- switched off as soon as the screwing process is started.
- switched on again when the screwing process is ended and the screw connection is NOT OK.

1.2.6 Fill level control

	Function	EtherCAT	Format
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Fill level control	aFSK	X	0/1
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aFSK is switched on when the min. fill level in the feed device goes below the default setting.

1.2.7 Automatic Mode

	Function	Bus	Format
Automatic Mode	aAuto	X	0/1

„aAuto“ is activ when the controller is running in the automatic mode.

1.2.8 Torque OK

	Function	EtherCAT	Format
Torque OK	aM_IO	X	0/1

aM_IO is

- switched off as soon as the screwing process is started.
- switched on again when the screwing process is ended and the default settings for the torque have been observed.

1.2.9 Depth OK

	Function	EtherCAT	Format
Depth OK	aT_IO	X	0/1

aT_IO is

- switched off as soon as the screwing process is started.
- switched on again when the screwing process is ended and the default settings for the depth have been observed.

1.2.10 Angle OK

	Function	EtherCAT	Format
Angle OK	aW_IO	X	0/1

aW_IO is

- switched off as soon as the screwing process is started.
- switched on again when the screwing process is ended and the default settings for the angle have been observed.

1.2.11 Time monitoring OK

	Function	EtherCAT	Format
Time monitoring OK	aZ_IO	X	0/1

aZ_IO is

- switched off as soon as the screwing process is started.
- switched on again when the screwing process is ended and the default settings for time monitoring have been observed.

1.2.12 Screw measurement

	Function	EtherCAT	Format
SM Bit0	aSmBit0	X	0/1
SM Bit1	aSmBit1	X	0/1
SM Bit2	aSmBit2	X	0/1

aSmBit0 .. aSmBit2 displays in binary code with which screw the screwdriver is loaded.

1.2.13 Torque

	Function	EtherCAT	Format
Torque	aM	X	-32768 ... 32767

aM displays the torque reached in cNm (1cNm = 0.01Nm).

As soon as the OK or NOK signal is active, the valid value is entered.
Otherwise 0 is entered in the variable.

1.2.14 Depth

	Function	EtherCAT	Format
Depth	aT	X	-32768 ... 32767

aT displays the depth reached in 1/10 mm.

As soon as the OK or NOK signal is active, the valid value is entered.
Otherwise 0 is entered in the variable.

1.2.15 Angle

	Function	EtherCAT	Format
Angle	aW	X	-32768 ... 32767

aW displays the angle reached in degrees.

As soon as the OK or NOK signal is active, the valid value is entered.
Otherwise 0 is entered in the variable.

1.2.16 Time

	Function	EtherCAT	Format
Time	aZ	X	-32768 ... 32767

aZ displays the duration of the screwing process in ms.

As soon as the OK or NOK signal is active, the valid value is entered,
Otherwise 0 is entered in the variable.

1.2.17 Programmable Customer Output

	Function	EtherCAT	Format	available
KDA1	aKda1	X	0/1	≥ 1.28

aKda1 is connected to the command SET A and RST A in the screw driving program.

2. EtherCAT connection

2.1 Properties of EtherCAT-slave:

Input I/O data size (bytes):	32
Output I/O data size (bytes)	32

Table 1: Properties EtherCAT-Slave

2.2 Input signals of the screwdriver control

Signal designation	Function	Data type	Format	Addr. Spindle 1	Addr. Spindle 2	Description
Status Word Gateway				0	-	
Start	eStart	bool	0/1	2.0	10.0	see section: 1.1.1
Program selection Bit 0	eProgBit0	bool	0/1	2.1	10.1	see section: 1.1.2
Program selection Bit 1	eProgBit1	bool	0/1	2.2	10.2	
Program selection Bit 2	eProgBit2	bool	0/1	2.3	10.3	
Program selection Bit 3	eProgBit3	bool	0/1	2.4	10.4	
Program selection Bit 4	eProgBit4	bool	0/1	2.5	10.5	
Program selection Bit 5	eProgBit5	bool	0/1	2.6	10.6	
Program selection Bit 6	eProgBit6	bool	0/1	2.7	10.7	
Screw selection Bit 0	eVeBit0	bool	0/1	3.0	11.0	see section: 1.1.3
Screw selection Bit 1	eVeBit1	bool	0/1	3.1	11.1	
Screw selection Bit 2	eVeBit2	bool	0/1	3.2	11.2	
Acknowledge fault	eAckStoer	bool	0/1	3.3	11.3	see section: 1.1.4
Request home position	eGstAnf	bool	0/1	3.4	11.4	see section: 1.1.5
res		bool	0/1	3.5	11.5	
res		bool	0/1	3.6	11.6	
res		bool	0/1	3.7	11.7	
KDE1	eKde1	bool	0/1	4.0	12.0	see section: 1.1.6
KDE2	eKde2	bool	0/1	4.1	12.1	
KDE3	eKde3	bool	0/1	4.2	12.2	
KDE4	eKde4	bool	0/1	4.3	12.3	
res	Res4	int	-32768 ... 32767	6	14	
res	Res6	int	-32768 ... 32767	8	16	

Table 2: Input signals of the screwdriver control EtherCAT-Slave

2.3 Output signals of the screwdriver control

Signal designation	Function	Data type	Format	Addr. Spindle 1	Addr. Spindle 2	Description
Status Word Gateway				0	-	
Fault	aStoer	bool	0/1	2.0	18.0	see section: 1.2.1
Home position	aGst	bool	0/1	2.1	18.1	see section: 1.2.2
Ready	aSb	bool	0/1	2.2	18.2	see section: 1.2.3
OK	aIO	bool	0/1	2.3	18.3	see section: 1.2.4
NOK	aNIO	bool	0/1	2.4	18.4	see section: 1.2.5
Fill level control	aFSK	bool	0/1	2.5	18.5	see section: 1.2.6
Automatic mode	aAuto	bool	0/1	2.6	18.6	see section: 1.2.7
res		bool	0/1	2.7	18.7	
Moment OK	aM_IO	bool	0/1	3.0	19.0	see section: 1.2.8
Depth OK	aT_IO	bool	0/1	3.1	19.1	see section: 1.2.9
Angle OK	aW_IO	bool	0/1	3.2	19.2	see section: 1.2.10
Time monitoring OK	aZ_IO	bool	0/1	3.3	19.3	see section: 1.2.11
SM Bit0	aSmBit0	bool	0/1	3.4	19.4	see section: 1.2.12
SM Bit1	aSmBit1	bool	0/1	3.5	19.5	
SM Bit2	aSmBit2	bool	0/1	3.6	19.6	
res		bool	0/1	3.7	19.7	
Moment	aM	int	-32768 ... 32767	4	20	see section: 1.2.13
Depth	aT	int	-32768 ... 32768	6	22	see section: 1.2.14
Angle	aW	int	-32768 ... 32768	8	24	see section: 1.2.15
Time	aZ	int	-32768 ... 32769	10	26	see section: 1.2.16
SM_SL	aSmSl	bool	0/1	12.0	28.0	
SM_SR	aSmSr	bool	0/1	12.1	28.1	
KDA1	aKda1	bool	0/1	12.2	28.2	see section: 1.2.17
KDA2	aKda2	bool	0/1	12.3	28.3	
KDA3	aKda3	bool	0/1	12.4	28.4	
KDA4	aKda	bool	0/1	12.5	28.5	
res	res	int	-32768 ... 32769	14	30	
res	res	int	-32768 ... 32769	16	32	

Table 3: Output signals of the screwdriver control EtherCAT-Slave

3. List of tables

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