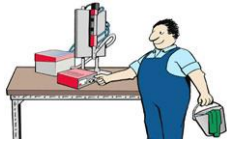




Communication signals between screwdriver control (MCS4100) and higher order control (MMI)

EtherCat



8 Description of the controller

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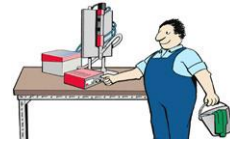


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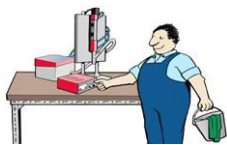
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STÖGER AUTOMATION GmbH points out that this interface description is not binding and may differ depending on the individual application.



8 Description of the controller

1. Input signals to MCS4100

1.1. Start

	Function	Format
Start	eStart	0/1

Starts the screwing sequence.

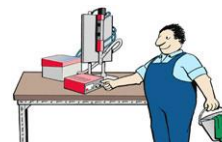
The screwing sequence can be started when:

- 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.

1.2. Program selection

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

eProgBit0 ... eProgBit3 or eProgBit6 preselects the screwing program for the next screwing cycle in binary form. A program number < 1 or > 50 is invalid.

**1.3. Screw selection**

	Function	Format	
Screw selection Bit 0	eVeBit0	0/1	VE-No. +1
Screw selection Bit 1	eVeBit1	0/1	VE-No. +2
Screw selection Bit 2	eVeBit2	0/1	VE-No. +4

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

1.4. Acknowledge fault

	Function	Format
Acknowledge fault	eAckStoer	0/1

Faults can be acknowledged externally with this signal.

1.5. Request home position

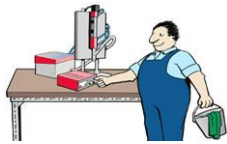
	Function	Format
Request home position	eGstAnf	0/1

This signal can be used to request the home position externally.

1.6. Programmable Customer Inputs

	Function	Format
KDE1	eKde1	0/1
KDE2	eKde2	0/1
KDE3	eKde3	0/1
KDE4	eKde4	0/1

eKde1 – eKde4 is connected to the command WAIT E in the screw driving program.



8 Description of the controller

2. Output signals from MCS4100

2.1. Fault

	Function	Format
Fault	aStoer	0/1

“aStoer” is switched on if there is a fault on the unit. As soon as the fault has been resolved, the output is switched off.

2.2. Homeposition

	Function	Format
Homeposition	aGst	0/1

“aGst” is switched on when the stroke of the spindle has reached the predetermined position in which it can be moved transversely to the workpiece (robot, positioning system) or the workpiece transversely to the screwdriver (production line with workpiece carriers). Otherwise collisions might happen!

2.3. Ready

	Function	Format
Ready	aSb	0/1

“aSb” is switched on when the spindle can be started by switching on the customer input “eStart”.

2.4. OK

	Function	Format
OK	aIO	0/1

“aIO” is switched off as soon as a cycle is started and is switched on again when the cycle is finished and the screw connection is OK.

**2.5. NOK**

	Function	Format
NOK	aNIO	0/1

“aNIO” is switched off as soon as a cycle is started and is switched on again when the cycle has ended and the screw connection is NOT OK.

2.6. Fill level control

	Function	Format
Fill level control	aFSK	0/1

“aFSK” is switched on when the min. fill level in the feed device goes below the default setting.

2.7. Automatic Mode

	Function	Format
Automatic mode	aAuto	0/1

“aAuto” is always present when the controller is in automatic mode.

2.8. Torque OK

	Function	Format
Torque OK	aM_IO	0/1

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



8 Description of the controller

2.9. Depth OK

	Function	Format
Depth OK	aT_IO	0/1

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

2.10. Angle OK

	Function	Format
Angle OK	aW_IO	0/1

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

2.11. Time monitoring OK

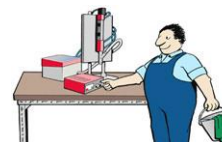
	Function	Format
Time monitoring OK	aZ_IO	0/1

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

2.12. Screw measurement

	Function	Format
SM Bit0	aSmBit0	0/1
SM Bit1	aSmBit1	0/1
SM Bit2	aSmBit0	0/1

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


2.13. Torque

	Function	Format
Torque	aM	-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.

2.14. Depth

	Function	Format
Depth	aT	-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.

2.15. Angle

	Function	Format
Angle	aW	-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.

2.16. Time

	Function	Format
Time	aZ	-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.

2.17. Screw measurement tube

	Function	Format
Screw measurement tube	aSmSI	0/1

“aSmSI” shows that a screw is in the feeding tube.



8 Description of the controller

2.18. Screw measurement screwdriver

	Function	Format
Screw measurement screwdriver	aSmSr	0/1

“aSmSr” shows that the screwdriver is loaded.

2.19. Programmable Customer Outputs

	Function	Format
KDA1	aKda1	0/1
KDA2	aKda2	0/1
KDA3	aKda3	0/1
KDA4	aKda4	0/1

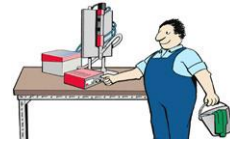
“aKda1 – aKda4” is connected to the command SET A and RST A in the screw driving program.

3. EtherCAT - connection

3.1. Properties

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

Table 1 Properties EtherCAT-Slave



3.2. Input signals to MCS4100

Signal designation	Function	Data-type	Format	Address Spindle 1	Address Spindle 2	Description
Start	eStart	Bool	0/1	I0.0	I8.0	s. ref.: 1.1
Programselection Bit 0	eProgBit0	Bool	0/1	I0.1	I8.1	s. ref.: 1.2
Programselection Bit 1	eProgBit1	Bool	0/1	I0.2	I8.2	s. ref.: 1.2
Programselection Bit 2	eProgBit2	Bool	0/1	I0.3	I8.3	s. ref.: 1.2
Programselection Bit 3	eProgBit3	Bool	0/1	I0.4	I8.4	s. ref.: 1.2
Programselection Bit 4	eProgBit4	Bool	0/1	I0.5	I8.5	s. ref.: 1.2
Programselection Bit 5	eProgBit5	Bool	0/1	I0.6	I8.6	s. ref.: 1.2
Programselection Bit 6	eProgBit6	Bool	0/1	I0.7	I8.7	s. ref.: 1.2
Screw selection Bit 0	eVeBit0	Bool	0/1	I1.0	I9.0	s. ref.: 1.3
Screw selection Bit 1	eVeBit1	Bool	0/1	I1.1	I9.1	s. ref.: 1.3
Screw selection Bit 2	eVeBit2	Bool	0/1	I1.2	I9.2	s. ref.: 1.3
Acknowledge fault	eAckStoer	Bool	0/1	I1.3	I9.3	s. ref.: 1.4
Request home position	eGstAnf	Bool	0/1	I1.4	I9.4	s. ref.: 1.5
KDE1	eKde1	Bool	0/1	I2.0	I10.0	s. ref.: 1.6
KDE2	eKde2	Bool	0/1	I2.1	I10.1	s. ref.: 1.6
KDE3	eKde3	Bool	0/1	I2.2	I10.2	s. ref.: 1.6
KDE4	eKde4	Bool	0/1	I2.3	I10.3	s. ref.: 1.6
Res	Res4	Int	-32768..32767	I4	I12	
Res	Res6	Int	-32768..32767	I6	I14	

Table 2 Input signals to MCS4100 EtherCAT



8 Description of the controller

3.3. Output signals from MCS4100

Signal designation	Function	Data-type	Format	Address Spindle 1	Address Spindle 2	Description
Fault	aStoer	Bool	0/1	O0.0	O16.0	s. ref.: 2.1
Home position	aGst	Bool	0/1	O0.1	O16.1	s. ref.: 2.2
Ready	aSb	Bool	0/1	O0.2	O16.2	s. ref.: 2.3
OK	aIO	Bool	0/1	O0.3	O16.3	s. ref.: 2.4
NOK	aNIO	Bool	0/1	O0.4	O16.4	s. ref.: 2.5
Fill level control	aFSK	Bool	0/1	O0.5	O16.5	s. ref.: 2.6
Automatic mode	aAuto	Bool	0/1	O0.6	O16.6	s. ref.: 2.7
Res		Bool	0/1	O0.7	O16.7	
Torque OK	aM_IO	Bool	0/1	O1.0	O17.0	s. ref.: 2.8
Depth OK	aT_IO	Bool	0/1	O1.1	O17.1	s. ref.: 2.9
Angle OK	aW_IO	Bool	0/1	O1.2	O17.2	s. ref.: 2.10
Time monitoring OK	aZ_IO	Bool	0/1	O1.3	O17.3	s. ref.: 2.11
SM Bit0	aSmBit0	Bool	0/1	O1.4	O17.4	s. ref.: 2.12
SM Bit1	aSmBit1	Bool	0/1	O1.5	O17.5	s. ref.: 2.12
SM Bit2	aSmBit2	Bool	0/1	O1.6	O17.6	s. ref.: 2.12
Res		Bool	0/1	O1.7	O17.7	
Torque	aM	Int	-32768..32767	O2	O18	s. ref.: 2.13
Depth	aT	Int	-32768..32767	O4	O20	s. ref.: 2.14
Angle	aW	Int	-32768..32767	O6	O22	s. ref.: 2.15
Time	aT	Int	-32768..32767	O8	O24	s. ref.: 2.16
Screw measurement tube	aSmSI	Bool		O10.0	O26.0	s. ref.: 2.17
Screw measurement screwdriver	aSmSr	Bool		O10.1	O26.1	s. ref.: 2.18
KDA1	aKda1	Bool		O10.2	O26.2	s. ref.: 2.19
KDA2	aKda2	Bool		O10.3	O26.3	s. ref.: 2.19
KDA3	aKda3	Bool		O10.4	O26.4	s. ref.: 2.19
KDA4	aKda4	Bool		O10.5	O26.5	s. ref.: 2.19
Res		Int	-32768..32767	O12	O28	
Res		Int	-32768..32767	O14	O30	

Table 3 Output signals from MCS4100 in EtherCAT

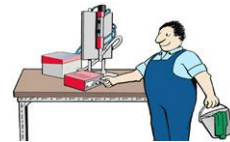
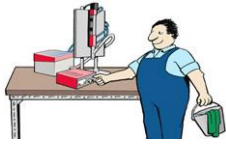


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8 Description of the controller
