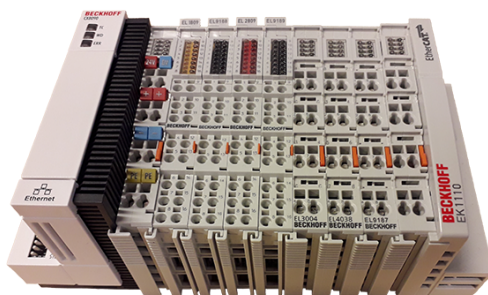


A7 Analog PLC



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1. A7 ANALOG PLC

The A7 Analog PLC (Programmable Logic Controller) is an analog I/O (input/output) device for communication between the A7 MIG Welding system and a welding robot. The I/O modules used in the A7 Analog PLC are provided by Beckhoff.

This manual describes the A7 Analog PLC connection diagrams and configuration operations required when upgrading from Kemparc Pulse to A7 MIG Welder.

This manual is intended for the use of trained specialists in control and automation engineering.

For any other information on the PLC system, refer to Beckhoff Information System in <https://www.beckhoff.com/>.

Product names and trademarks

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2. A7 LITE ANALOG PLC

The following displays the A7 Lite Analog PLC module package.

	0A1		CX8090		1A1		EL1809		9A1		EL9188		2A1		EL2809		9A2		EL9189		9A3 EK1110			
	CPU WIN CE				16 DI 24VDC				16 24VDC				16 DO 24VDC				16 -0VDC				EtherCat			
X001	1	24V	0V	5	1	Ch1	Ch9	9	1	24V	24V	9	1	Ch1	Ch9	9	1	0V	0V	9	1		5	
X101					2	Ch2	Ch10	10	2	24V	24V	10	2	Ch2	Ch10	10	2	0V	0V	10				
X102	2	24V	24V	6	3	Ch3	Ch11	11	3	24V	24V	11	3	Ch3	Ch11	11	3	0V	0V	11	2		6	
					4	Ch4	Ch12	12	4	24V	24V	12	4	Ch4	Ch12	12	4	0V	0V	12				
	3	0V	0V	7	5	Ch5	Ch13	13	5	24V	24V	13	5	Ch5	Ch13	13	5	0V	0V	13	3		7	
S101					6	Ch6	Ch14	14	6	24V	24V	14	6	Ch6	Ch14	14	6	0V	0V	14				
	4	PE	PE	8	7	Ch7	Ch15	15	7	24V	24V	15	7	Ch7	Ch15	15	7	0V	0V	15	4		8	
					8	Ch8	Ch16	16	8	24V	24V	16	8	Ch8	Ch16	16	8	0V	0V	16				

The I/O modules are the following:

- 0A1 - CX8090 (CPU WIN CE)
- 1A1 - EL1809 (Digital input terminal, 16 x 24V DC)
- 9A1 - EL9188 (Potential distribution terminal, 16 x 24V DC)
- 2A1 - EL2809 (Digital output terminal, 16 x 24V DC)
- 9A2 - EL9189 (Potential distribution terminal, 16 x 0V DC)
- 9A3 - EK1110 (EtherCAT coupler)

The connection diagram of each module is described in its own section.

"Connection diagram of 0A1" on page 10

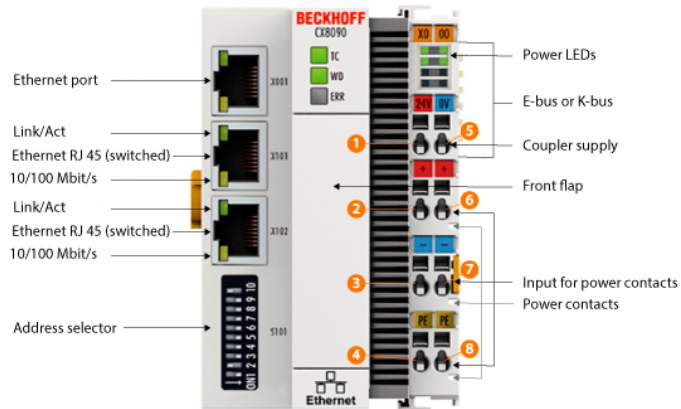
"Connection diagram of 1A1/9A1" on page 11

"Connection diagram of 2A1/9A2" on page 12

"Connection diagram of 9A3" on page 8

2.1 Connection diagram of 0A1

This section describes the connection diagram of 0A1 - CX8090 (CPU WIN CE).



X001 - Ethernet 192.168.02

X101 - Ethernet DHCP

X102 - Ethernet DHCP

S101 - DIP switch

1 - ON

2 - ON

3 - ON

4 - ON

5 - ON

6 - ON

7 - ON

8 - ON

9 - ON

10 - OFF

1 - Jump to 0A1/2

2 - Jump to 0A1/1

3 - Jump to 0A1/5

4 - PE

5 - Jump to 0A1/3

6 - 24VDC power

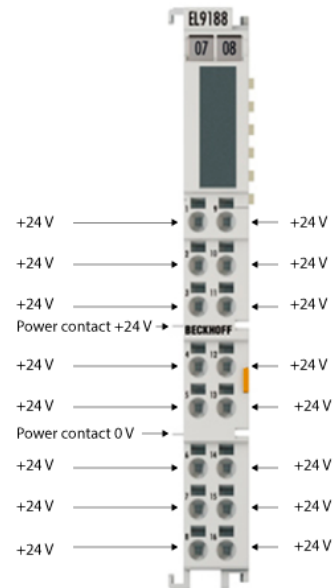
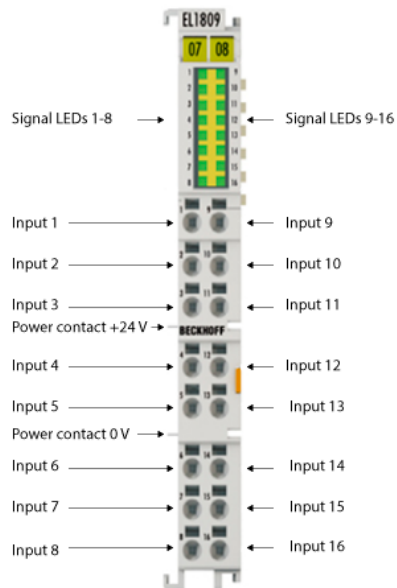
7 - 0V power

8 - PE

2.2 Connection diagram of 1A1/9A1

This section describes the connection diagrams of the following:

- 1A1 - EL1809 (Digital input terminal, 16 x 24V DC)
- 9A1 - EL9188 (Potential distribution terminal, 16 x 24V DC)



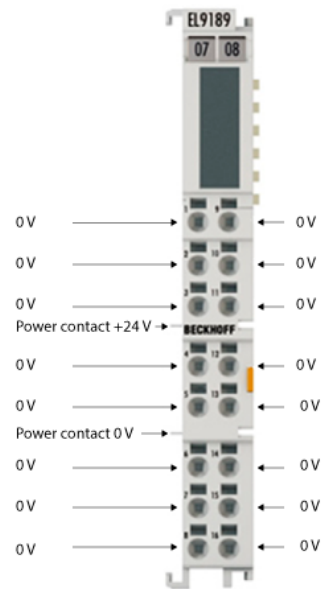
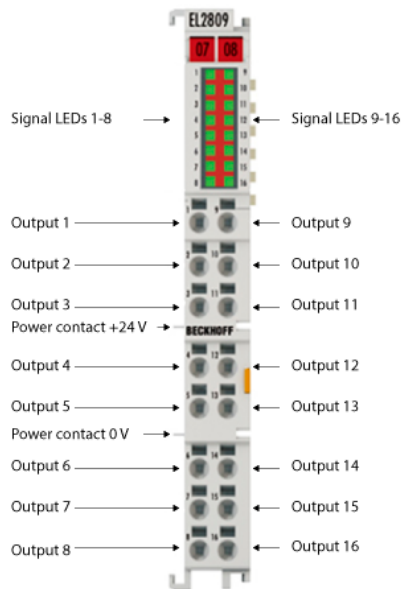
- 1 - Channel bit 0
- 2 - Channel bit 1
- 3 - Channel bit 2
- 4 - Channel bit 3
- 5 - Channel bit 4
- 6 - Channel bit 5
- 7 - Channel bit 6
- 8 - Channel bit 7

- 9 - StartWelding
- 10 - WireInch
- 11 - WireRetract
- 12 - GasBlow
- 13 - AirBlow
- 14 - TouchSensorOn
- 15 - OnlineControl
- 16 - ErrorReset

2.3 Connection diagram of 2A1/9A2

This section describes the connection diagrams of the following:

- 2A1 - EL2809 (Digital output terminal, 16 x 24V DC)
- 9A2 - EL9189 (Potential distribution terminal, 16 x 0V DC)

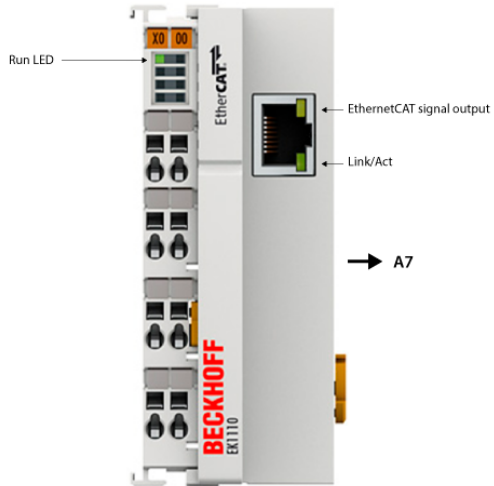


- 1 - ErrorNumber bit 0
- 2 - ErrorNumber bit 1
- 3 - ErrorNumber bit 2
- 4 - ErrorNumber bit 3
- 5 - ErrorNumber bit 4
- 6 - ErrorNumber bit 5
- 7 - ErrorNumber bit 6
- 8 - ErrorNumber bit 7

- 9 - Ready
- 10 - PowerSourceReady
- 11 - CycleOn
- 12 - ArcOn
- 13 - GasFlowOK
- 14 - TouchSensed
- 15 - Error
- 16 - CollisionDetected

2.4 Connection diagram of 9A3

This section describes the connection diagram of 9A3 - EK1110 (EtherCAT coupler).



3. A7 FULL ANALOG PLC

The following displays the A7 Full Analog PLC module package.

	0A1	CX8090	1A1	EL1809	9A1	EL9188	2A1	EL2809	9A2	EL9189	3A1	EL3004	4A1	EL4038	9A3	KL9187	9A4	EK1110																		
	CPU WIN CE		16 DI 24VDC				16 DO 24VDC				16 -0VDC		8 AI -10V...+10V		4 AO -10V...+10V		8 0VDC		EtherCat																	
X001	1	24V	0V	5	1	Ch1	Ch9	9	1	24V	24V	9	1	Ch1	Ch9	9	1	0V	0V	9	1	Ch1	Ch2	5	1	Ch1	Ch2	5	1	0V	0V	5	1		5	
X101					2	Ch2	Ch10	10	2	24V	24V	10	2	Ch2	Ch10	10	2	0V	0V	10																
X102	2	24V	24V	6	3	Ch3	Ch11	11	3	24V	24V	11	3	Ch3	Ch11	11	3	0V	0V	11	2	GND	GND	6	2	Ch3	Ch4	6	2	0V	0V	6	2		6	
					4	Ch4	Ch12	12	4	24V	24V	12	4	Ch4	Ch12	12	4	0V	0V	12																
					3	0V	0V	7	5	Ch5	Ch13	13	5	Ch5	Ch13	13	5	0V	0V	13	3	Ch3	Ch4	7	3	Ch5	Ch6	7	3	0V	0V	7	3		7	
S101					6	Ch6	Ch14	14	6	24V	24V	14	6	Ch6	Ch14	14	6	0V	0V	14																
	4	PE	PE	8	7	Ch7	Ch15	15	7	24V	24V	15	7	Ch7	Ch15	15	7	0V	0V	15	4	GND	GND	8	4	Ch7	Ch8	8	4	0V	0V	8	4		8	
					8	Ch8	Ch16	16	8	24V	24V	16	8	Ch8	Ch16	16	8	0V	0V	16																

The I/O modules are the following:

- 0A1 - CX8090 (CPU WIN CE)
- 1A1 - EL1809 (Digital input terminal, 16 x 24 V DC)
- 9A1 - EL9188 (Potential distribution terminal, 16 x 24 V DC)
- 2A1 - EL2809 (Digital output terminal, 16 x 24 V DC)
- 9A2 - EL9189 (Potential distribution terminal, 16 x 0 V DC)
- 3A1 - EL3004 (4-channel analog input terminal 0...20 mA, single-ended, 12 bit)
- 4A1 - EL4038 (8-channel analog output terminal -10...+10 V, 12 bit)
- 9A3 - KL9187 (Potential distribution terminal, 8 x 0 V DC)
- 9A4 - EK1110 (EtherCAT coupler)

The connection diagram of each module is described in its own section.

"Connection diagram of 0A1" on the next page

"Connection diagram of 1A1/9A1" on page 11

"Connection diagram of 2A1/9A2" on page 12

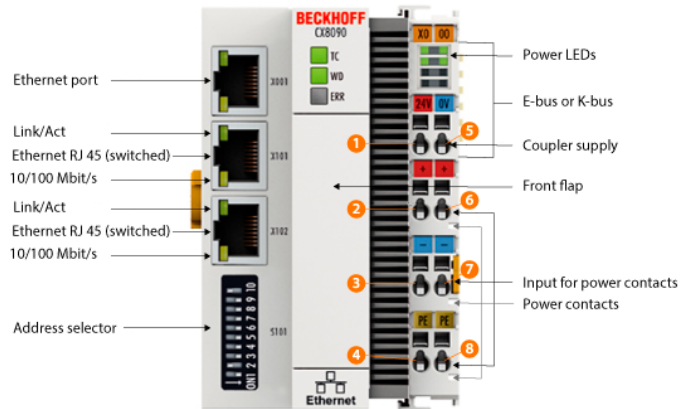
"Connection diagram of 3A1" on page 13

"Connection diagram of 4A1/9A3" on page 14

"Connection diagram of 9A4" on page 15

3.1 Connection diagram of 0A1

This section describes the connection diagram of 0A1 - CX8090 (CPU WIN CE).



X001 - Ethernet 192.168.02

X101 - Ethernet DHCP

X102 - Ethernet DHCP

S101 - DIP switch

1 - ON

2 - ON

3 - ON

4 - ON

5 - ON

6 - ON

7 - ON

8 - ON

9 - ON

10 - OFF

1 - Jump to 0A1/2

2 - Jump to 0A1/1

3 - Jump to 0A1/5

4 - PE

5 - Jump to 0A1/3

6 - 24VDC power

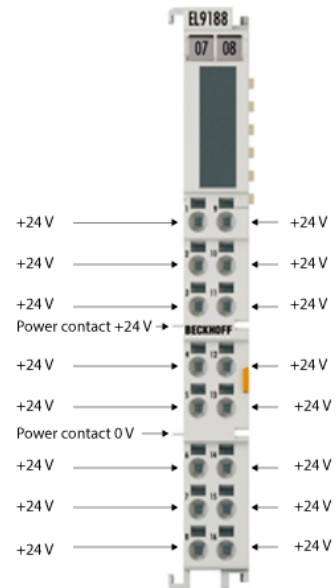
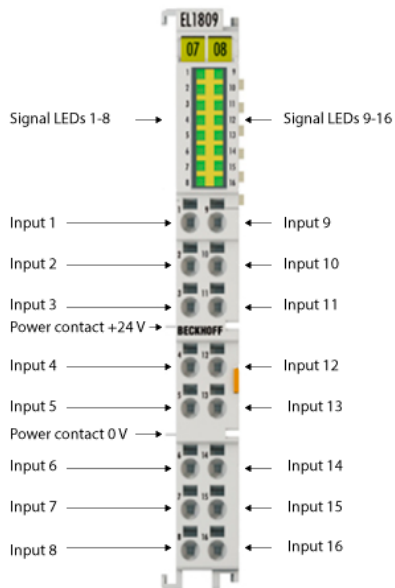
7 - 0V power

8 - PE

3.2 Connection diagram of 1A1/9A1

This section describes the connection diagrams of the following:

- 1A1 - EL1809 (Digital input terminal, 16 x 24V DC)
- 9A1 - EL9188 (Potential distribution terminal, 16 x 24V DC)



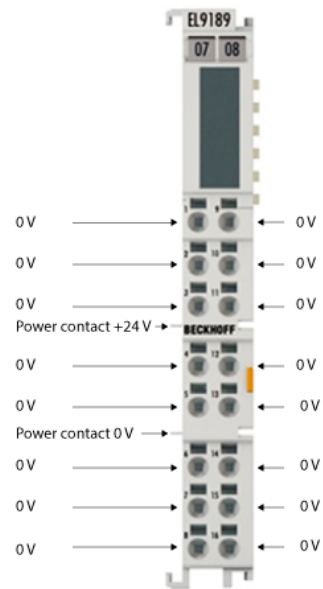
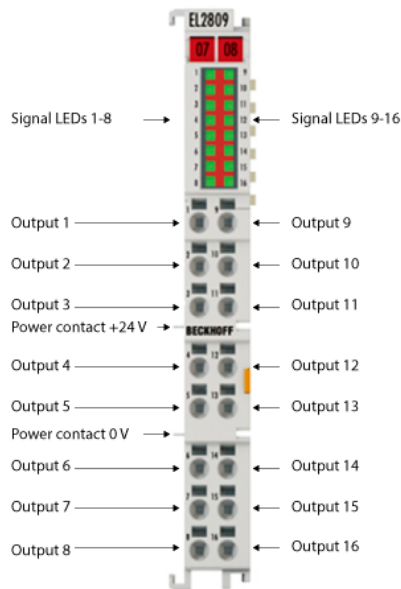
- 1 - Channel bit 0
- 2 - Channel bit 1
- 3 - Channel bit 2
- 4 - Channel bit 3
- 5 - Channel bit 4
- 6 - Channel bit 5
- 7 - Channel bit 6
- 8 - Channel bit 7

- 9 - StartWelding
- 10 - WireInch
- 11 - WireRetract
- 12 - GasBlow
- 13 - AirBlow
- 14 - TouchSensorOn
- 15 - OnlineControl
- 16 - ErrorReset

3.3 Connection diagram of 2A1/9A2

This section describes the connection diagrams of the following:

- 2A1 - EL2809 (Digital output terminal, 16 x 24V DC)
- 9A2 - EL9189 (Potential distribution terminal, 16 x 0V DC)

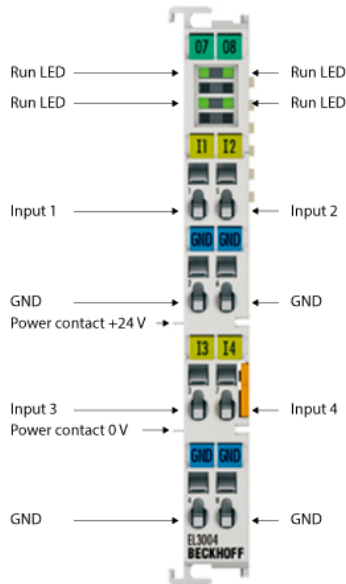


- 1 - ErrorNumber bit 0
- 2 - ErrorNumber bit 1
- 3 - ErrorNumber bit 2
- 4 - ErrorNumber bit 3
- 5 - ErrorNumber bit 4
- 6 - ErrorNumber bit 5
- 7 - ErrorNumber bit 6
- 8 - ErrorNumber bit 7

- 9 - Ready
- 10 - PowerSourceReady
- 11 - CycleOn
- 12 - ArcOn
- 13 - GasFlowOK
- 14 - TouchSensed
- 15 - Error
- 16 - CollisionDetected

3.4 Connection diagram of 3A1

This section describes the connection diagram of 3A1 - EL3004 (4-channel analog input terminal 0...20mA, single-ended, 12 bit).

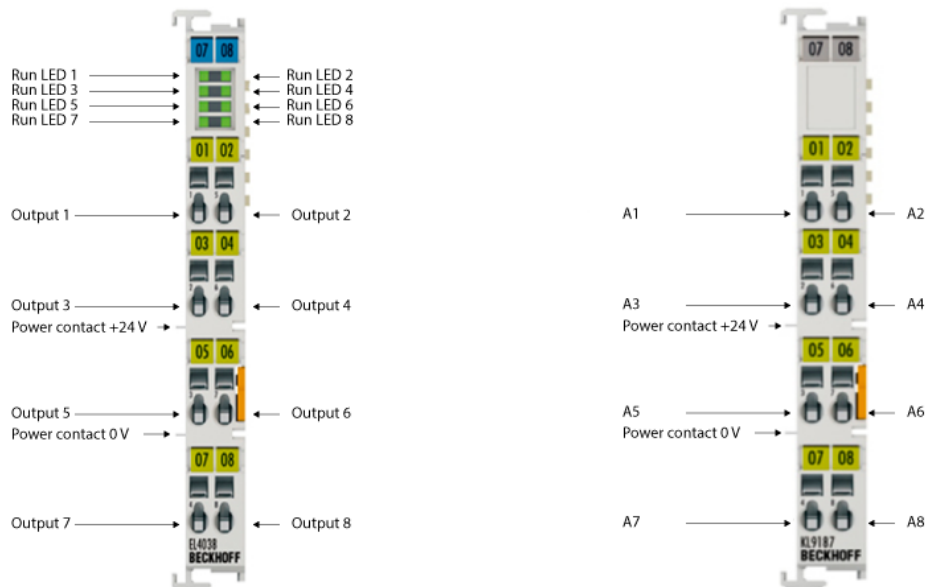


1, 2	WFS	0...10V = 0.5...25 m/min
3, 4	Dynamics	0...10V = -9...9
5, 6	Voltage/FineTuning	0...10V = Voltage 8...46V, FineTuning 0...18
7, 8	Spare	

3.5 Connection diagram of 4A1/9A3

This section describes the connection diagrams of the following:

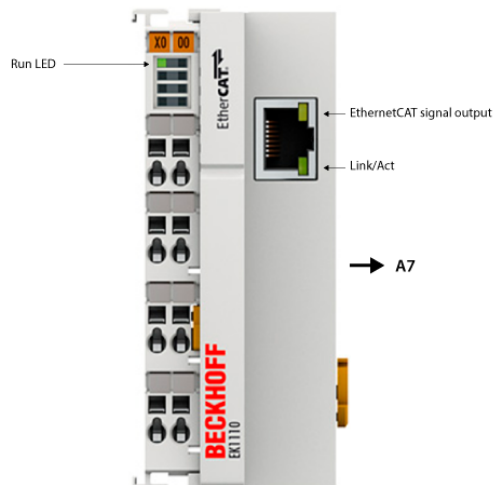
- 4A1 - EL4038 (8-channel analog output terminal -10...+10V, 12 bit)
- 9A3 - KL9187 (Potential distribution terminal, 8 x 0V DC)



1	WeldingCurrent	0...10V = 0...1024A
2	WFS	0...10V = 0...25m/min
3	Spare	
4	Spare	
5	WeldingVoltage	0...10V = 8...46V
6	Spare	
7	Spare	
8	Spare	

3.6 Connection diagram of 9A4

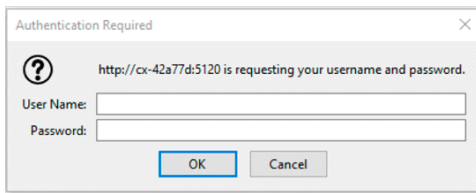
This section describes the connection diagram of 9A4 - EK1110 (EtherCAT coupler).



4. SPECIFYING IP ADDRESS

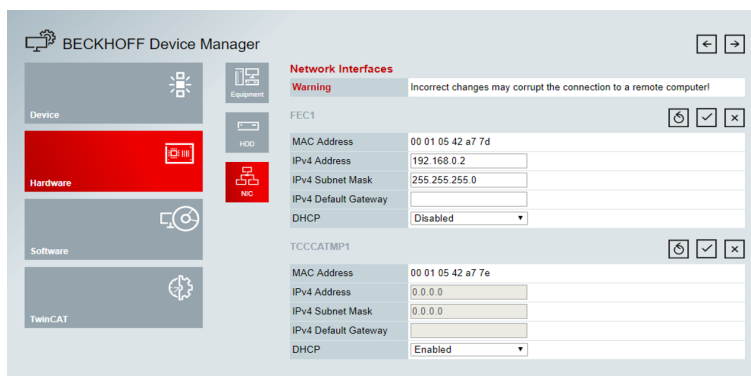
To establish connection to the A7 Analog PLC, specify an IP address:

1. Open a network browser on your computer.
2. Enter the IP address **192.168.0.2/config**.
3. Use the following authentication information:
 - User Name: **guest**
 - Password: **1**



4. Click OK.

The Beckhoff Device Manager opens.



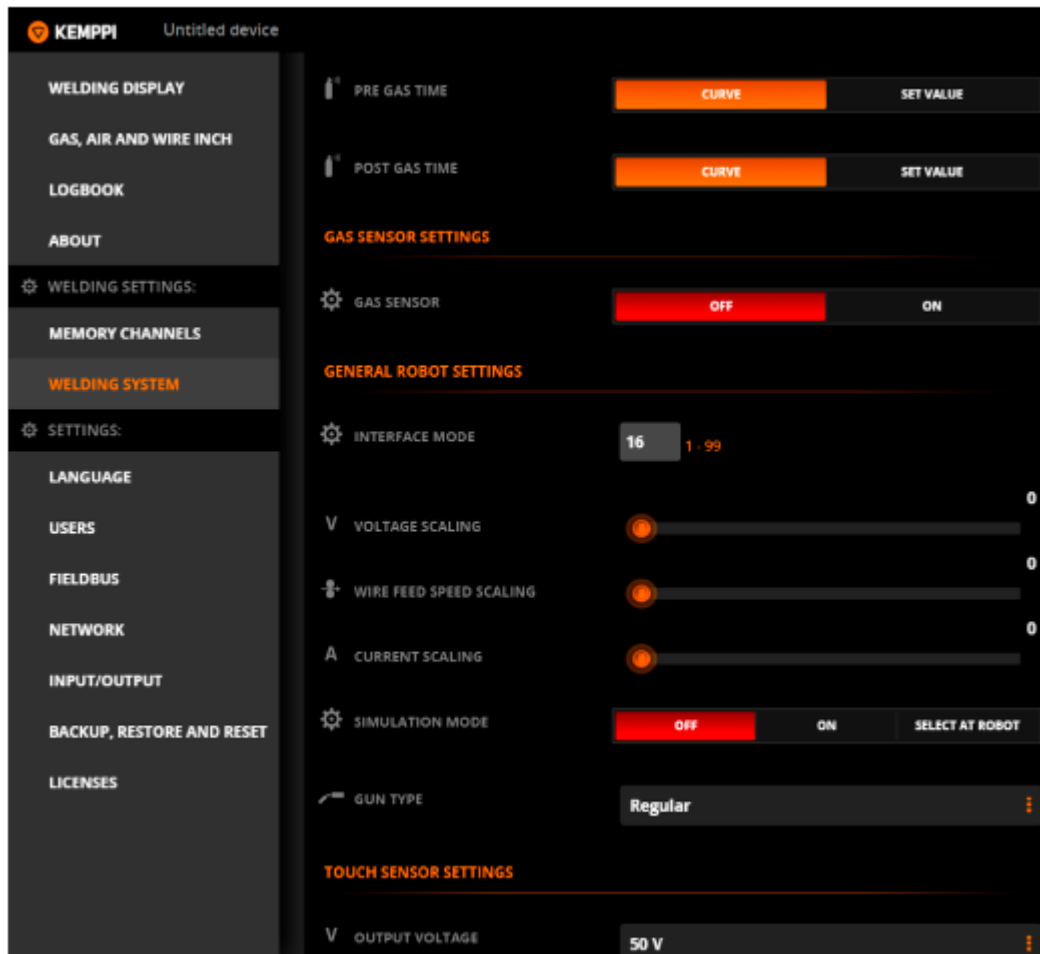
The interfaces visible to the operating system are:

- X001 - IP addressing via the operating system; the default is DHCP (Dynamic Host Configuration Protocol), represented in the operating system as FEC1.
- X101/102 - IP addressing via the DIP switches, represented in the operating system as TCCCATMP1. The DIP switches 1...8 are ON and DIP switches 9...10 are OFF.

5. SPECIFYING INTERFACE MODE

Communication between the A7 MIG Welder and a welding robot is based on I/O tables. Specify the I/O table number in the web user interface's **Interface mode** field:

1. In the web user interface, go to **Welding settings** > **Welding system** > **General robot settings**.
2. Set the **Interface mode** to 16.



3. Click **Save** to save the setting.