Demo-Rack mobile IoT V1.0

BECKHOFF

Supply
24 V DC max. 4 A

S01
C6015 (24 V) on/off
Fuse F01 (4 A)

S02
I/O (24 V) on/off
Fuse F02 (4 A)

S01

S02

Supply

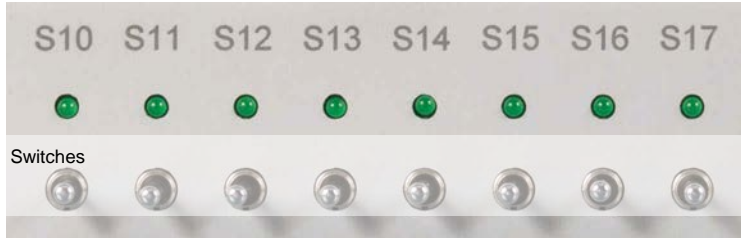24V 0V   24V 0V

F01   F02

Switches S10 – S17

Switches
S10 – S17
↑latching /↓ momentary

Control Element	Input (Digital)	Terminal Position	Signal Type
S10 N/O contact	EL1859 - Input 1 - Pin 1	-BC1(EK1100) -> -DC1 (EL1859)	BOOL
S11 N/O contact	EL1859 - Input 2 - Pin 2	-BC1(EK1100) -> -DC1 (EL1859)	BOOL
S12 N/O contact	EL1859 - Input 3 - Pin 3	-BC1(EK1100) -> -DC1 (EL1859)	BOOL
S13 N/O contact	EL1859 - Input 4 - Pin 4	-BC1(EK1100) -> -DC1 (EL1859)	BOOL
S14 N/O contact	EL1859 - Input 5 - Pin 5	-BC1(EK1100) -> -DC1 (EL1859)	BOOL
S15 N/O contact	EL1859 - Input 6 - Pin 6	-BC1(EK1100) -> -DC1 (EL1859)	BOOL
S16 N/O contact	EL1859 - Input 7 - Pin 7	-BC1(EK1100) -> -DC1 (EL1859)	BOOL
S17 N/O contact	EL1859 - Input 8 - Pin 8	-BC1(EK1100) -> -DC1 (EL1859)	BOOL

LEDs
H10 - H17

Control Element	Output (Digital)	Terminal Position	Signal Type
H10	EL1859 - Output 1 - Pin 9	-BC1(EK1100) -> -DC1 (EL1859)	BOOL
H11	EL1859 - Output 2 - Pin 10	-BC1(EK1100) -> -DC1 (EL1859)	BOOL
H12	EL1859 - Output 3 - Pin 11	-BC1(EK1100) -> -DC1 (EL1859)	BOOL
H13	EL1859 - Output 4 - Pin 12	-BC1(EK1100) -> -DC1 (EL1859)	BOOL
H14	EL1859 - Output 5 - Pin 13	-BC1(EK1100) -> -DC1 (EL1859)	BOOL
H15	EL1859 - Output 6 - Pin 14	-BC1(EK1100) -> -DC1 (EL1859)	BOOL
H16	EL1859 - Output 7 - Pin 15	-BC1(EK1100) -> -DC1 (EL1859)	BOOL
H17	EL1859 - Output 8 - Pin 16	-BC1(EK1100) -> -DC1 (EL1859)	BOOL

Switches S20 – S27

Switches
S20 – S27
↑latching / ↓ momentary

Control Element	Input (Digital)	Terminal Position	Signal Type
S20 N/O contact	EL1859 - Input 1 - Pin 1	-BC1(EK1100) -> -DC2 (EL1859)	BOOL
S21 N/O contact	EL1859 - Input 2 - Pin 2	-BC1(EK1100) -> -DC2 (EL1859)	BOOL
S22 N/O contact	EL1859 - Input 3 - Pin 3	-BC1(EK1100) -> -DC2 (EL1859)	BOOL
S23 N/O contact	EL1859 - Input 4 - Pin 4	-BC1(EK1100) -> -DC2 (EL1859)	BOOL
S24 N/O contact	EL1859 - Input 5 - Pin 5	-BC1(EK1100) -> -DC2 (EL1859)	BOOL
S25 N/O contact	EL1859 - Input 6 - Pin 6	-BC1(EK1100) -> -DC2 (EL1859)	BOOL
S26 N/O contact	EL1859 - Input 7 - Pin 7	-BC1(EK1100) -> -DC2 (EL1859)	BOOL
S27 N/O contact	EL1859 - Input 8 - Pin 8	-BC1(EK1100) -> -DC2 (EL1859)	BOOL

LEDs H20 – H27

LEDs
H20 – H27

Control Element	Output (Digital)	Terminal Position	Signal Type
H20	EL1859 - Output 1 - Pin 9	-BC1(EK1100) -> -DC2 (EL1859)	BOOL
H21	EL1859 - Output 2 - Pin 10	-BC1(EK1100) -> -DC2 (EL1859)	BOOL
H22	EL1859 - Output 3 - Pin 11	-BC1(EK1100) -> -DC2 (EL1859)	BOOL
H23	EL1859 - Output 4 - Pin 12	-BC1(EK1100) -> -DC2 (EL1859)	BOOL
H24	EL1859 - Output 5 - Pin 13	-BC1(EK1100) -> -DC2 (EL1859)	BOOL
H25	EL1859 - Output 6 - Pin 14	-BC1(EK1100) -> -DC2 (EL1859)	BOOL
H26	EL1859 - Output 7 - Pin 15	-BC1(EK1100) -> -DC2 (EL1859)	BOOL
H27	EL1859 - Output 8 - Pin 16	-BC1(EK1100) -> -DC2 (EL1859)	BOOL

Potentiometer R10 - R11

Potentiometer
R10 - R11
(10V / 10k Ohm)

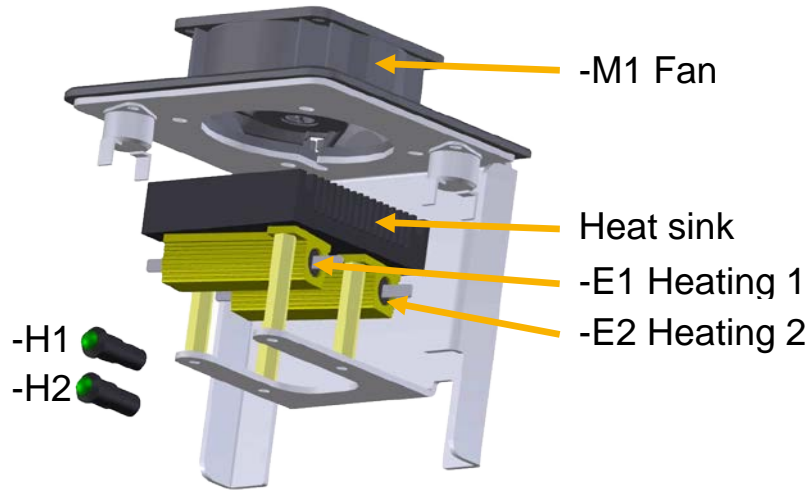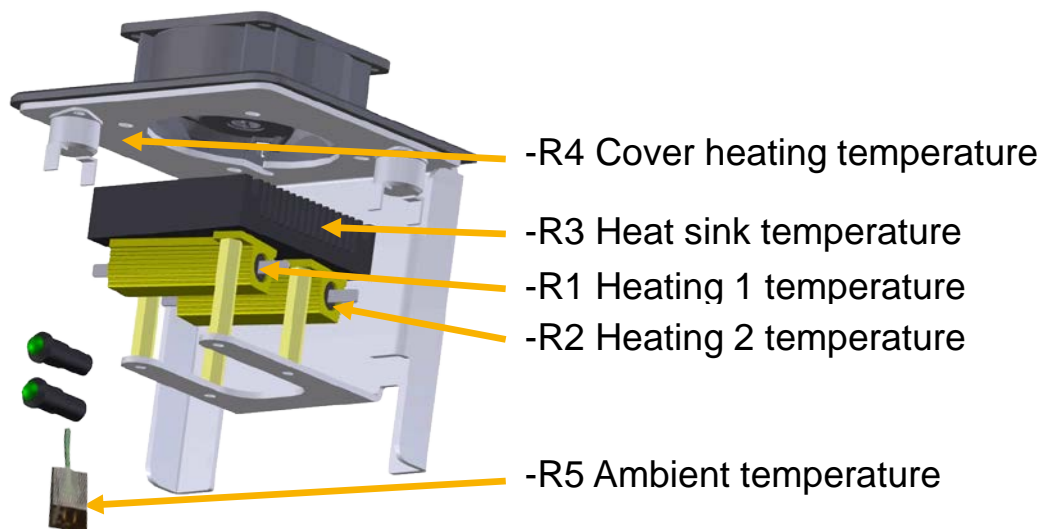| Control Element	Input (Analog)	Terminal Position	Signal Type
R10	EL3255 - Input 1 - Pin 2	-BC1(EK1100) -> -AI1 (EL3255)	INT
R11	EL3255 - Input 2 - Pin 5	-BC1(EK1100) -> -AI1 (EL3255)	INT

Handwheel / push button S18

Handwheel / Push Button S18
24 increments / rotation x 4-fold evaluation

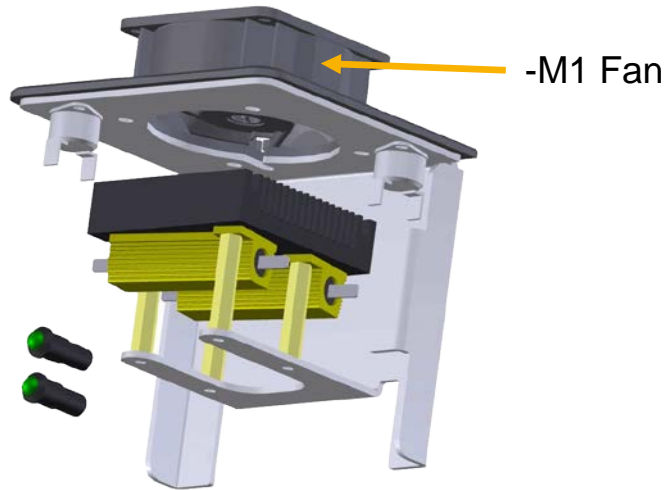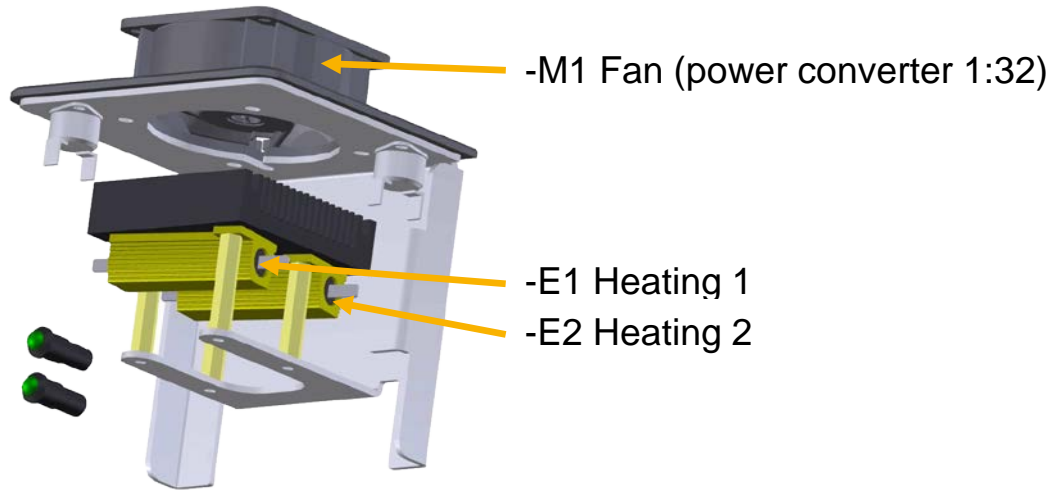| Control Element	Input (Digital)	Terminal Position	Signal Type
S18 Handwheel	EL5151 – Input A / B - Pin 1 / 5	-BC1(EK1100) -> -PM1 (EL5151)	UINT
S18 Push Button	EL5151 - Latch - Pin 8	-BC1(EK1100) -> -PM1 (EL5151)	BOOL

Heating

- -M1 Fan
- Heat sink
- -E1 Heating 1
- -E2 Heating 2
- -H1
- -H2

Control Element	Input (Digital)	Terminal Position	Signal Type
-E1 Heating 1	EL2034 – Output 1 - Pin 1	-BC1(EK1100) -> -D01 (EL2034)	BOOL
-E1 Heating 1 aktiv	EL1004 – Input 1 - Pin 1	-BC1(EK1100) -> -DI1 (EL1004)	BOOL
-E2 Heating 2	EL2034 – Output 2 - Pin 5	-BC1(EK1100) -> -D02 (EL2034)	BOOL
-E2 Heating 2 aktiv	EL1004 – Input 2 - Pin 5	-BC1(EK1100) -> -DI2 (EL1004)	BOOL
-H1 Led 1	EL2034 – Output 3 - Pin 4	-BC1(EK1100) -> -D03 (EL2034)	BOOL
-H2 Led 2	EL2034 – Output 4 - Pin 8	-BC1(EK1100) -> -D04 (EL2034)	BOOL

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Thermocouples

-R4 Cover heating temperature

-R3 Heat sink temperature

-R1 Heating 1 temperature

-R2 Heating 2 temperature

-R5 Ambient temperature

Control Element	Input (Digital)	Terminal Position	Signal Type
-R1 Heating 1	EL3318 – Input 1 - Pin 1/9	-BC1(EK1100) -> -AI2 (EL3318)	INT
-R2 Heating 1	EL3318 – Input 2 - Pin 2/10	-BC1(EK1100) -> -AI2 (EL3318)	INT
-R3 Heat sink	EL3318 – Input 3 - Pin 3/11	-BC1(EK1100) -> -AI2 (EL3318)	INT
-R4 Cover heating	EL3318 – Input 4 - Pin 4/12	-BC1(EK1100) -> -AI2 (EL3318)	INT
-R5 Ambient	EL3318 – Input 5 - Pin 5/13	-BC1(EK1100) -> -AI2 (EL3318)	INT

Fan

-M1 Fan

Control Element	Input (Digital)	Terminal Position	Signal Type
-M1 Fan	EL7332 – Motor Output 1 - Pin 1/5	-BC1(EK1100) -> -PM2 (EL7332)	INT

Power measurement

-M1 Fan (power converter 1:32)

-E1 Heating 1
-E2 Heating 2

Control Element	Input (Digital)	Terminal Position	Signal Type
-E1 Heating 1	EL3443 – Voltage 1 - Pin 1	-BC1(EK1100) -> -AI3 (EL3443)	BOOL
-E1 Heating 1	EL3443 – Current 1 - Pin 5	-BC1(EK1100) -> -AI3 (EL3443)	BOOL
-E2 Heating 2	EL3443 – Voltage 2 - Pin 2	-BC1(EK1100) -> -AI3 (EL3443)	BOOL
-E2 Heating 2	EL3443 – Current 2 - Pin 6	-BC1(EK1100) -> -AI3 (EL3443)	BOOL
-M1 Fan	EL3443 – Voltage 3 - Pin 3	-BC1(EK1100) -> -AI3 (EL3443)	BOOL
-M1 Fan	EL3443 – Current 3 - Pin 7	-BC1(EK1100) -> -AI3 (EL3443)	BOOL

```
(* GVL00_IO *)
{attribute 'TcContextName' := 'PlcTask'}
VAR_GLOBAL

            (* EL1859 digital inputs and outputs *)
            {attribute 'OPC.UA.DA' := '1'}
            bSwitchS10                          AT%I*  :BOOL;  (* Switch S10 - heating 1 on/off *)
            {attribute 'OPC.UA.DA' := '1'}
            bSwitchS11                          AT%I*  :BOOL;  (* Switch S11 - heating 2 on/off *)
            {attribute 'OPC.UA.DA' := '1'}
            bSwitchS12                          AT%I*  :BOOL;  (* Switch S12 - fan on/off *)
            {attribute 'OPC.UA.DA' := '1'}
            bSwitchS13                          AT%I*  :BOOL;  (* Switch S13 - blinker 1 on/off *)
            {attribute 'OPC.UA.DA' := '1'}
            bSwitchS14                          AT%I*  :BOOL;  (* Switch S14 - blinker 2 on/off *)
            {attribute 'OPC.UA.DA' := '1'}
            bSwitchS15                          AT%I*  :BOOL;  (* Switch S15 - clock signal 500ms on/off*)
            {attribute 'OPC.UA.DA' := '1'}
            bSwitchS16                          AT%I*  :BOOL;  (* Switch S16 - clock signal 1s on/off*)
            {attribute 'OPC.UA.DA' := '1'}
            bSwitchS17                          AT%I*  :BOOL;  (* Switch S17 - clock signal 2s on/off*)

            {attribute 'OPC.UA.DA' := '1'}
            bLedH10                             AT%Q*  :BOOL; (* LED H10 - heating 1 on *)
            {attribute 'OPC.UA.DA' := '1'}
            bLedH11                             AT%Q*  :BOOL; (* LED H11 - heating 2 on *)
            {attribute 'OPC.UA.DA' := '1'}
            bLedH12                             AT%Q*  :BOOL; (* LED H12 - fan 1 on *)
            {attribute 'OPC.UA.DA' := '1'}
            bLedH13                             AT%Q*  :BOOL; (* LED H13 - blinker 1 *)
            {attribute 'OPC.UA.DA' := '1'}
            bLedH14                             AT%Q*  :BOOL; (* LED H14 - blinker 2 *)
            {attribute 'OPC.UA.DA' := '1'}
            bLedH15                             AT%Q*  :BOOL; (* LED H15 - clock signal 500ms *)
            {attribute 'OPC.UA.DA' := '1'}
            bLedH16                             AT%Q*  :BOOL; (* LED H16 - clock signal 1s *)
            {attribute 'OPC.UA.DA' := '1'}
            bLedH17                             AT%Q*  :BOOL; (* LED H17 - clock signal 2s *)
```

Global variables I/O

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```
(* EL1859 digital inputs/outputs *)
{attribute 'OPC.UA.DA' := '1'}
bSwitchS20                            AT%I*  :BOOL;   (* Switch S20 - not in use *)
{attribute 'OPC.UA.DA' := '1'}
bSwitchS21                            AT%I*  :BOOL;   (* Switch S21 - not in use *)
{attribute 'OPC.UA.DA' := '1'}
bSwitchS22                            AT%I*  :BOOL;   (* Switch S22 - not in use *)
{attribute 'OPC.UA.DA' := '1'}
bSwitchS23                            AT%I*  :BOOL;   (* Switch S23 - not in use *)
{attribute 'OPC.UA.DA' := '1'}
bSwitchS24                            AT%I*  :BOOL;   (* Switch S24 - not in use *)
{attribute 'OPC.UA.DA' := '1'}
bSwitchS25                            AT%I*  :BOOL;   (* Switch S25 - not in use *)
{attribute 'OPC.UA.DA' := '1'}
bSwitchS26                            AT%I*  :BOOL;   (* Switch S26 - not in use *)
{attribute 'OPC.UA.DA' := '1'}
bSwitchS27                            AT%I*  :BOOL;   (* Switch S27 - not in use *)


{attribute 'OPC.UA.DA' := '1'}
bLedH20                               AT%Q*  :BOOL;  (* LED H20 - temperature heat sink >23.75C° *)
{attribute 'OPC.UA.DA' := '1'}
bLedH21                               AT%Q*  :BOOL;  (* LED H21 - temperature heat sink >27.50C° *)
{attribute 'OPC.UA.DA' := '1'}
bLedH22                               AT%Q*  :BOOL;  (* LED H22 - temperature heat sink >31,25C° *)
{attribute 'OPC.UA.DA' := '1'}
bLedH23                               AT%Q*  :BOOL;  (* LED H23 - temperature heat sink >35.00C° *)
{attribute 'OPC.UA.DA' := '1'}
bLedH24                               AT%Q*  :BOOL;  (* LED H24 - temperature heat sink >38.75C° *)
{attribute 'OPC.UA.DA' := '1'}
bLedH25                               AT%Q*  :BOOL;  (* LED H25 - temperature heat sink >42.50C° *)
{attribute 'OPC.UA.DA' := '1'}
bLedH26                               AT%Q*  :BOOL;  (* LED H26 - temperature heat sink >46.25C° *)
{attribute 'OPC.UA.DA' := '1'}
bLedH27                               AT%Q*  :BOOL;  (* LED H27 - temperature heat sink >50.00C° *)
```

```
(* EL1004 digital inputs *)
{attribute 'OPC.UA.DA' := '1'}
bHeating1Aktiv                            AT%I*  :BOOL;   (* Heating 1 aktiv *)
{attribute 'OPC.UA.DA' := '1'}
bHeating2Aktiv                            AT%I*  :BOOL;   (* Heating 2 aktiv *)

(* EL2034 digital outputs *)
{attribute 'OPC.UA.DA' := '1'}
bHeating1                                 AT%Q*  :BOOL;  (* Heating 1 *)
{attribute 'OPC.UA.DA' := '1'}
bHeating2                                 AT%Q*  :BOOL;  (* Heating 2 *)
{attribute 'OPC.UA.DA' := '1'}
bHeating1Led                              AT%Q*  :BOOL;  (* Heating 1 Led - flash slow (temperature > 40.0) –
                                                            flash fast (temperature > 45.0) *)
{attribute 'OPC.UA.DA' := '1'}
bHeating2Led                              AT%Q*  :BOOL;  (* Heating 2 Led - flash slow (temperature > 40.0) –
                                                            flash fast (temperature > 45.0) *)

(* EL3255 0..10V analog inputs *)
{attribute 'OPC.UA.DA' := '1'}
nAnalogInR10                              AT%I*  :INT;      (* Analog input R10 - fan velocity *)
{attribute 'OPC.UA.DA' := '1'}
nAnalogInR11                              AT%I*  :INT;      (* Analog input R11 - blinker 1 flash speed *)

(* EL5151 incremental encoder 24 increments/rotation * 4-fold evaluation -> 96  increments/rotation*)
{attribute 'OPC.UA.DA' := '1'}
nHandwheelCounter                         AT%I*  :UINT;    (* handwheel counter *)
{attribute 'OPC.UA.DA' := '1'}
bHandwheelSwitchS18                       AT%I*  :BOOL;   (* Switch S18 *)
```

Global variables I/O

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```
(* EL3318 8-channel thermocouple inputs *)
{attribute 'OPC.UA.DA' := '1'}
nTemperatureHeating1                    AT%I*  :INT;      (* Temperature heating 1 *)
{attribute 'OPC.UA.DA' := '1'}
nTemperatureHeating2                    AT%I*  :INT;      (* Temperature heating 2 *)
{attribute 'OPC.UA.DA' := '1'}
nTemperatureHeatSink                    AT%I*  :INT;      (* Temperature heat sink *)
{attribute 'OPC.UA.DA' := '1'}
nTemperatureCoverHeating                AT%I*  :INT;      (* Temperature cover heating *)
{attribute 'OPC.UA.DA' := '1'}
nTemperatureAmbient                     AT%I*  :INT;      (* Temperature ambient *)

(* EL7332 2-channel DC motor output stage - fan *)
{attribute 'OPC.UA.DA' := '1'}
nFanStatus                              AT%I*  :UINT;     (* Fan status *)
{attribute 'OPC.UA.DA' := '1'}
nVeloFan                                AT%Q*  :INT;      (* Fan velocity*)
{attribute 'OPC.UA.DA' := '1'}
nFanContol                              AT%Q*  :UINT;     (* Fan control *)

(* EL3443 3-phase power measurement terminal *)
{attribute 'OPC.UA.DA' := '1'}
fVoltageHeating1                        AT%I*  :REAL;     (* Voltage heating 1 (V)*)
{attribute 'OPC.UA.DA' := '1'}
fCurrentHeating1                        AT%I*  :REAL;     (* Current heating 1 (A)*)
{attribute 'OPC.UA.DA' := '1'}
fVoltageHeating2                        AT%I*  :REAL;     (* Voltage heating 1 (V)*)
{attribute 'OPC.UA.DA' := '1'}
fCurrentHeating2                        AT%I*  :REAL;     (* Current heating 1 (A)*)
{attribute 'OPC.UA.DA' := '1'}
fVoltageFan                             AT%I*  :REAL;     (* Voltage fan 1 (V)*)
{attribute 'OPC.UA.DA' := '1'}
fCurrentFan                             AT%I*  :REAL;     (* Current fan 1 (power converter 1:32) (A*32) *)

END_VAR
(* End *)
```

Contact

BECKHOFF

Beckhoff Automation GmbH & Co. KG
Head office
Hülshorstweg 20
33415 Verl
Germany