



-power in control

## MULTI-LINE 2 DESCRIPTION OF OPTIONS



### Option H8 External I/O modules

- Description of option
- Functional description
- Parameter list



DEIF A/S · Frisenborgvej 33 · DK-7800 Skive · Tel.: +45 9614 9614 · Fax: +45 9614 9615 · info@deif.com · www.deif.com

Document no.: 4189340524A

**This description of options covers the following products:**

|       |                   |
|-------|-------------------|
| AGC   | SW version 3.3X.X |
| BGC   | SW version 3.0X.X |
| GC-1F | SW version 1.2X.X |

## Table of contents

|                                                         |           |
|---------------------------------------------------------|-----------|
| <b>1. WARNINGS AND LEGAL INFORMATION.....</b>           | <b>4</b>  |
| LEGAL INFORMATION AND RESPONSIBILITY .....              | 4         |
| ELECTROSTATIC DISCHARGE AWARENESS .....                 | 4         |
| SAFETY ISSUES .....                                     | 4         |
| FACTORY SETTINGS .....                                  | 4         |
| DEFINITIONS .....                                       | 4         |
| <b>2. DESCRIPTION OF OPTION .....</b>                   | <b>5</b>  |
| OPTION H8 .....                                         | 5         |
| AGC INTERFACE .....                                     | 5         |
| BGC INTERFACE .....                                     | 6         |
| GC-1F INTERFACE .....                                   | 7         |
| INSTALLATION OF BECKHOFF CONTROLLER (BUS COUPLER) ..... | 8         |
| <b>3. FUNCTIONAL DESCRIPTION.....</b>                   | <b>10</b> |
| SUPPORTED MODULES.....                                  | 10        |
| FUNCTIONAL CHECK OF EXTERNAL I/O MODULES .....          | 11        |
| <b>4. PARAMETER LIST .....</b>                          | <b>14</b> |
| COMMUNICATION SETUP .....                               | 14        |
| EXTERNAL I/O SETUP .....                                | 16        |
| <b>5. FAULT FINDING .....</b>                           | <b>18</b> |
| DIAGNOSTIC LEDs .....                                   | 19        |

## 1. Warnings and legal information

### Legal information and responsibility

DEIF takes no responsibility for installation or operation of the engine set. If there is any doubt about how to install or operate the engine controlled by the unit, the company responsible for the installation or the operation of the set must be contacted.

**The units are not to be opened by unauthorised personnel. If opened anyway, the warranty will be lost.**

### Electrostatic discharge awareness

Sufficient care must be taken to protect the terminals against static discharges during the installation. Once the unit is installed and connected, these precautions are no longer necessary.

### Safety issues

Installing the unit implies work with dangerous currents and voltages. Therefore, the installation should only be carried out by authorised personnel who understand the risks involved in working with live electrical equipment.



**Be aware of the hazardous live currents and voltages. Do not touch any AC measurement inputs as this could lead to injury or death.**

### Factory settings

The unit is delivered with certain factory settings. Given the fact that these settings are based on average values, they are not necessarily the correct settings for matching the individual engine. Thus precautions must be taken to check the settings before running the engine.

### Definitions

Throughout this document a number of notes and warnings will be presented. To ensure that these are noticed, they will be highlighted in order to separate them from the general text.

#### Notes



**The notes provide general information, which will be helpful for the reader to bear in mind.**

#### Warning



**The warnings indicate a potentially dangerous situation, which could result in death, personal injury or damaged equipment, if certain guidelines are not followed.**

## 2. Description of option

### Option H8

H8 is a CANbus based serial interface for External I/O controllers. This option gives the possibility to add more inputs and outputs to ML-2 controllers via the CANbus.

ML-2 controllers support the CANopen protocol. This protocol is based on the CANopen Application Layer and Communication Profile Specification CiA Draft Standard 301 Version 4.02. It is not the purpose of this document to describe all the functionalities of the CANopen communication. The CANopen is implemented and runs according to the CANopen standards and needs no special attention from the user.



**Please use the website <http://www.can-cia.com> to download a detailed explanation of the CANopen description.**

### AGC interface



**Wiring details: please refer to the document 'Installation Instructions'.**

### Terminal description

The PCB for the external I/O modules are placed in slot #6 (option H8.6) and/or slot #8 (option H8.8).

#### Option H8.6

| Terminals | Function | Description             |
|-----------|----------|-------------------------|
| 97        | CAN-H    | CANbus card option H8.6 |
| 96        | CAN-GND  |                         |
| 95        | CAN-L    |                         |
| 94        | CAN-H    |                         |
| 93        | CAN-GND  |                         |
| 92        | CAN-L    |                         |
| 91        | Not used |                         |
| 90        | Not used |                         |



**Terminals 97 and 94 are internally connected.  
Terminals 95 and 92 are internally connected.**

## Option H8.8

| Terminals | Function | Description             |
|-----------|----------|-------------------------|
| 133       | CAN-H    | CANbus card option H8.8 |
| 132       | CAN-GND  |                         |
| 131       | CAN-L    |                         |
| 130       | CAN-H    |                         |
| 129       | CAN-GND  |                         |
| 128       | CAN-L    |                         |
| 127       | Not used |                         |
| 126       | Not used |                         |



**Terminals 133 and 130 are internally connected.  
Terminals 131 and 128 are internally connected.**

**BGC interface**

**Wiring details: please refer to the document 'Installation Instructions'.**

**Terminal description**

The CAN terminals are placed in slot #2 (option H8.2) or slot #3 (option H8.3) in addition to the standard hardware. Both CAN buses can be mounted simultaneously.

## Option H8.2 terminals

| Terminals | Function | Description             |
|-----------|----------|-------------------------|
| 47        | CAN-H    | CANbus card option H8.2 |
| 48        | CAN-GND  |                         |
| 49        | CAN-L    |                         |
| 50        | CAN-H    |                         |
| 51        | CAN-GND  |                         |
| 52        | CAN-L    |                         |
| 53        | Not used |                         |
| 54        | Not used |                         |



**Terminals 47 and 50 are internally connected.  
Terminals 49 and 52 are internally connected.**

## Option H8.3 terminals

| Terminals | Function | Description             |
|-----------|----------|-------------------------|
| 55        | CAN-H    | CANbus card option H8.3 |
| 56        | CAN-GND  |                         |
| 57        | CAN-L    |                         |
| 58        | CAN-H    |                         |
| 59        | CAN-GND  |                         |
| 60        | CAN-L    |                         |
| 61        | Not used |                         |
| 62        | Not used |                         |



Terminals 55 and 58 are internally connected.  
Terminals 57 and 60 are internally connected.

## GC-1F interface



Wiring details: please refer to the document 'Installation Instructions and Reference Handbook'.

## Terminal description

The CAN #2 terminals are 57(H) and 59(L) also used for AOP-2(See option X4).

| Terminals | Function | Description                             |
|-----------|----------|-----------------------------------------|
| 57        | CAN-H    | CAN #2: terminals for CAN Communication |
| 58        | CAN-GND  |                                         |
| 59        | CAN-L    |                                         |

## Installation of Beckhoff controller (Bus coupler)

Following is step by step guide to setup the communication between the ML-2 unit and the Beckhoff modules.



**Documentation regarding Beckhoff modules can be found at [www.beckhoff.com](http://www.beckhoff.com)**

### Beckhoff controller setup

1. Set Baud rate to 'AUTO'
2. Set Node ID to a value between 10 and 64
3. Connect the required I/O modules to the controller
4. Mount "End Bus Terminal": KL9010 module

### CANbus wiring

5. Disconnect power to ML-2 and the Beckhoff controller
6. Connect CANbus wires to the Beckhoff controller according to 'Installations Instructions'



**AGC/BGC: please refer to the document 'Installation Instructions'.**



**GC-1F: please refer to the document 'Installation Instructions and Reference Handbook'.**

### ML-2 unit

7. Connect power to ML-2 unit and Beckhoff controller
8. Set the baud rate (default: 50kbit/s)



**GC-1F: baud rate is fixed at 50kbit/s.**

9. Set the Node ID (menu 7973/7983) to the same value as selected on the Beckhoff controller.



**GC-1F: Menu 7973 not available**

10. Communication between the ML-2 unit and the Beckhoff controller are now established.



**Communication fault: In case any LEDs on the Beckhoff controller are flashing continuously for more than 5s please refer to the chapter 'Fault finding' in this document.**



11. To see the available external I/Os retrieve the parameters from the ML-2 unit with the PC USW.
12. Click on 'External I/O' in the PC USW to see or change settings for External I/O modules.

### 3. Functional description

---

#### Supported modules

The ML-2 units support communication with the following Beckhoff modules.

##### Controller (BUS coupler)

| Type   | Numbers of I/O's supported by ML-2                         |
|--------|------------------------------------------------------------|
| BK5120 | 8 analogue inputs, 16 digital inputs and 16 digital output |
| BK5150 | 8 analogue inputs, 16 digital inputs and 16 digital output |
| LC5100 | 16 digital inputs and 16 digital outputs                   |

##### Analogue Input modules

|        |                                             |
|--------|---------------------------------------------|
| KL3001 | 1 ch. $\pm 10V$                             |
| KL3002 | 2 ch. $\pm 10V$                             |
| KL3404 | 4 ch. $\pm 10V$                             |
| KL3061 | 1 ch. 0-10V                                 |
| KL3062 | 2 ch. 0-10V                                 |
| KL3064 | 4 ch. 0-10V                                 |
| KL3011 | 1 ch. 0-20mA                                |
| KL3012 | 2 ch. 0-20mA                                |
| KL3021 | 1 ch. 4-20mA                                |
| KL3022 | 2 ch. 4-20mA                                |
| KL3041 | 1 ch. 0-20mA                                |
| KL3042 | 2 ch. 0-20mA                                |
| KL3044 | 4 ch. 0-20mA                                |
| KL3052 | 2 ch. 4-20mA                                |
| KL3202 | 2 ch. Pt100, Pt1000, 10-1200ohm, 10-3200ohm |
| KL3204 | 4 ch. Pt100, Pt1000, 10-1200ohm, 10-3200ohm |
| KL3312 | 2 ch. Thermocouple type K                   |
| KL3314 | 4 ch. Thermocouple type K                   |
| KL3444 | 4 ch. 0-20mA                                |
| KL3454 | 4 ch. 4-20mA                                |

##### Analogue Output modules

|        |                   |
|--------|-------------------|
| KL4011 | 1 channel 0-20mA  |
| KL4012 | 2 channel 0-20mA  |
| KL4021 | 1 channel 4-20mA  |
| KL4022 | 2 channel 4-20mA  |
| KL4001 | 1 channel 0-10V   |
| KL4002 | 2 channel 0-10V   |
| KL4004 | 4 channel 0-10V   |
| KL4031 | 1 channel -10-10V |
| KL4032 | 2 channel -10-10V |
| KL4034 | 4 channel -10-10V |

**Digital Input modules**

|        |                     |
|--------|---------------------|
| KL1002 | 2 ch. 24V DC        |
| KL1104 | 4 ch. 24V DC        |
| KL1408 | 8 ch. 24V DC        |
| KL1702 | 2 ch. 230V AC       |
| KL1052 | 2 ch. p/n switching |
| KL1154 | 4 ch. p/n switching |
| KM1002 | 16 ch. 24V DC       |

**Digital Output modules**

|        |                    |
|--------|--------------------|
| KL2012 | 2 ch. 24V DC/0,5A  |
| KL2022 | 2 ch. 24V DC/2,0A  |
| KL2114 | 4 ch. 24V DC/0,5A  |
| KL2408 | 8 ch. 24V DC/0,5A  |
| KL2602 | 2 ch. 230V AC      |
| KM2002 | 16 ch. 24V DC/0,5A |

**End Bus Terminal**

|        |                  |
|--------|------------------|
| KL9010 | End Bus Terminal |
|--------|------------------|



**GC-1F: Analogue output modules not supported**



**Detailed specification of the Beckhoff modules can be found at [www.beckhoff.com](http://www.beckhoff.com)**

**Functional check of External I/O modules****Alarm messages in display**

| Alarm message        | Description                                                                                                                                         |
|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| Ext. I/O unk. module | The module used is not supported by the ML-2 unit                                                                                                   |
| Ext. I/O new setup   | If modules are changed or have changed place in the row of modules. This error message will be active. Can be removed by reset in menu 7974 "Reset" |

**Module check**

The module check can only take place using the PC USW.

Modules are presented in the order by which they are mounted, counting from the CANbus controller side.

External I/O's will only be shown in PC USW if they are present.

The result of the check can be read in status channels 12950-12983.

The Beckhoff module transmits a status message to the unit. This message is a HEX value for digital I/O units and decimal for controllers / analogue I/O units:

## Digital I/O:

| All groups                                        | Protection | Sync                | Regulation | Binary | Analag | Outputs | General | Mains   | Comm    | Jump                                | Cmd timer | VDO 1     | VDO 2 | VDO 3 | USW | External VO |
|---------------------------------------------------|------------|---------------------|------------|--------|--------|---------|---------|---------|---------|-------------------------------------|-----------|-----------|-------|-------|-----|-------------|
| Drag a column header here to group by that column |            |                     |            |        |        |         |         |         |         |                                     |           |           |       |       |     |             |
| Category                                          | Channel    | Text                | Address    | Value  | Unit   | Timer   | OutputA | OutputB | Enabled | High alarm                          | Level     | FailClass |       |       |     |             |
| External IO                                       | 12000      | Ext Ana. In 1.1     | 999        | 10     | mA     |         | 10      | 0       | 0       | <input checked="" type="checkbox"/> | Customer  | Warning   |       |       |     |             |
| External IO                                       | 12010      | Ext Ana. In 1.2     | 1000       | 10     | mA     |         | 10      | 0       | 0       | <input checked="" type="checkbox"/> | Customer  | Warning   |       |       |     |             |
| External IO                                       | 12030      | Ext Ana. In 2.1     | 1001       | 10     | mA     |         | 10      | 0       | 0       | <input checked="" type="checkbox"/> | Customer  | Warning   |       |       |     |             |
| External IO                                       | 12040      | Ext Ana. In 2.2     | 1002       | 10     | mA     |         | 10      | 0       | 0       | <input checked="" type="checkbox"/> | Customer  | Warning   |       |       |     |             |
| External IO                                       | 12060      | Ext Ana. In 3.1     | 1003       | 100    | C      |         | 10      | 0       | 0       | <input checked="" type="checkbox"/> | Customer  | Warning   |       |       |     |             |
| External IO                                       | 12070      | Ext Ana. In 3.2     | 1004       | 100    | C      |         | 10      | 0       | 0       | <input checked="" type="checkbox"/> | Customer  | Warning   |       |       |     |             |
| External IO                                       | 12090      | Ext Ana. In 4.1     | 1005       | 100    | C      |         | 10      | 0       | 0       | <input checked="" type="checkbox"/> | Customer  | Warning   |       |       |     |             |
| External IO                                       | 12100      | Ext Ana. In 4.2     | 1006       | 100    | C      |         | 10      | 0       | 0       | <input checked="" type="checkbox"/> | Customer  | Warning   |       |       |     |             |
| External IO                                       | 12120      | Ext Ana. In 5.1     | 1007       | 100    | C      |         | 10      | 0       | 0       | <input checked="" type="checkbox"/> | Customer  | Warning   |       |       |     |             |
| External IO                                       | 12130      | Ext Ana. In 5.2     | 1008       | 100    | C      |         | 10      | 0       | 0       | <input checked="" type="checkbox"/> | Customer  | Warning   |       |       |     |             |
| External IO                                       | 12150      | Ext Ana. In 6.1     | 1009       | 100    | C      |         | 10      | 0       | 0       | <input checked="" type="checkbox"/> | Customer  | Warning   |       |       |     |             |
| External IO                                       | 12160      | Ext Ana. In 6.2     | 1010       | 100    | C      |         | 10      | 0       | 0       | <input checked="" type="checkbox"/> | Customer  | Warning   |       |       |     |             |
| External IO                                       | 12180      | Ext Ana. In 7.1     | 1011       | 100    | C      |         | 10      | 0       | 0       | <input checked="" type="checkbox"/> | Customer  | Warning   |       |       |     |             |
| External IO                                       | 12190      | Ext Ana. In 7.2     | 1012       | 100    | C      |         | 10      | 0       | 0       | <input checked="" type="checkbox"/> | Customer  | Warning   |       |       |     |             |
| External IO                                       | 12210      | Ext Ana. In 8.1     | 1013       | 100    | C      |         | 10      | 0       | 0       | <input checked="" type="checkbox"/> | Customer  | Warning   |       |       |     |             |
| External IO                                       | 12220      | Ext Ana. In 8.2     | 1014       | 100    | C      |         | 10      | 0       | 0       | <input checked="" type="checkbox"/> | Customer  | Warning   |       |       |     |             |
| External IO                                       | 12540      | Ext Dig. In 1       | 1047       | N/A    |        |         | 10      | 0       | 0       | <input checked="" type="checkbox"/> | Customer  | Shutdown  |       |       |     |             |
| External IO                                       | 12550      | Ext Dig. In 2       | 1048       | N/A    |        |         | 10      | 0       | 0       | <input checked="" type="checkbox"/> | Customer  | Shutdown  |       |       |     |             |
| External IO                                       | 12560      | Ext Dig. In 3       | 1049       | N/A    |        |         | 10      | 0       | 0       | <input checked="" type="checkbox"/> | Customer  | Shutdown  |       |       |     |             |
| External IO                                       | 12570      | Ext Dig. In 4       | 1050       | N/A    |        |         | 10      | 0       | 0       | <input checked="" type="checkbox"/> | Customer  | Shutdown  |       |       |     |             |
| External IO                                       | 12580      | Ext Dig. In 5       | 1051       | N/A    |        |         | 10      | 0       | 0       | <input checked="" type="checkbox"/> | Customer  | Shutdown  |       |       |     |             |
| External IO                                       | 12590      | Ext Dig. In 6       | 1052       | N/A    |        |         | 10      | 0       | 0       | <input checked="" type="checkbox"/> | Customer  | Shutdown  |       |       |     |             |
| External IO                                       | 12600      | Ext Dig. In 7       | 1053       | N/A    |        |         | 10      | 0       | 0       | <input checked="" type="checkbox"/> | Customer  | Shutdown  |       |       |     |             |
| External IO                                       | 12610      | Ext Dig. In 8       | 1054       | N/A    |        |         | 10      | 0       | 0       | <input checked="" type="checkbox"/> | Customer  | Shutdown  |       |       |     |             |
| External IO                                       | 12620      | Ext Dig. In 9       | 1055       | N/A    |        |         | 10      | 0       | 0       | <input checked="" type="checkbox"/> | Customer  | Shutdown  |       |       |     |             |
| External IO                                       | 12630      | Ext Dig. In 10      | 1056       | N/A    |        |         | 10      | 0       | 0       | <input checked="" type="checkbox"/> | Customer  | Shutdown  |       |       |     |             |
| External IO                                       | 12790      | Ext Dig. Out 1      | 1063       | 0      |        |         | 0       | N/A     | N/A     | <input type="checkbox"/>            | Customer  | N/A       |       |       |     |             |
| External IO                                       | 12800      | Ext Dig. Out 2      | 1064       | 0      |        |         | 0       | N/A     | N/A     | <input type="checkbox"/>            | Customer  | N/A       |       |       |     |             |
| External IO                                       | 12810      | Ext Dig. Out 3      | 1065       | 0      |        |         | 0       | N/A     | N/A     | <input type="checkbox"/>            | Customer  | N/A       |       |       |     |             |
| External IO                                       | 12820      | Ext Dig. Out 4      | 1066       | 0      |        |         | 0       | N/A     | N/A     | <input type="checkbox"/>            | Customer  | N/A       |       |       |     |             |
| External IO                                       | 12830      | Ext Dig. Out 5      | 1067       | 0      |        |         | 0       | N/A     | N/A     | <input type="checkbox"/>            | Customer  | N/A       |       |       |     |             |
| External IO                                       | 12840      | Ext Dig. Out 6      | 1068       | 0      |        |         | 0       | N/A     | N/A     | <input type="checkbox"/>            | Customer  | N/A       |       |       |     |             |
| External IO                                       | 12850      | Ext Dig. Out 7      | 1069       | 0      |        |         | 0       | N/A     | N/A     | <input type="checkbox"/>            | Customer  | N/A       |       |       |     |             |
| External IO                                       | 12860      | Ext Dig. Out 8      | 1070       | 0      |        |         | 0       | N/A     | N/A     | <input type="checkbox"/>            | Customer  | N/A       |       |       |     |             |
| External IO                                       | 12951      | Ext Module 1 Status | 958        | -30718 |        |         | N/A     | N/A     | N/A     | <input type="checkbox"/>            | Customer  | N/A       |       |       |     |             |
| External IO                                       | 12952      | Ext Module 2 Status | 959        | -30719 |        |         | N/A     | N/A     | N/A     | <input type="checkbox"/>            | Customer  | N/A       |       |       |     |             |
| External IO                                       | 12953      | Ext Module 3 Status | 960        | 3012   |        |         | N/A     | N/A     | N/A     | <input type="checkbox"/>            | Customer  | N/A       |       |       |     |             |
| External IO                                       | 12954      | Ext Module 4 Status | 961        | 3204   |        |         | N/A     | N/A     | N/A     | <input type="checkbox"/>            | Customer  | N/A       |       |       |     |             |
| External IO                                       | 12955      | Ext Module 5 Status | 962        | -32255 |        |         | N/A     | N/A     | N/A     | <input type="checkbox"/>            | Customer  | N/A       |       |       |     |             |
| External IO                                       | 12956      | Ext Module 6 Status | 963        | 3312   |        |         | N/A     | N/A     | N/A     | <input type="checkbox"/>            | Customer  | N/A       |       |       |     |             |

1. digit: 8 for digital
2. digit: Number of input/output (2, 4 or 8)
3. digit: Not used (0)
4. digit: Input [1] or output [2]

In the PC USW, all values are presented as decimal values, so the HEX values for the digital I/O modules are translated as follows:

Inputs:

0x8201h = -32255d

0x8401h = -31743d

0x8801h = -30719d

Outputs:

0x8202h = -32254d

0x8402h = -31742d

0x8802h = -30718d

Examples for digital I/O modules:

| Module | Hex Value | Dec Value |
|--------|-----------|-----------|
| KL2012 | 8202      | -32254    |
| KL2022 | 8282      | -32254    |
| KL2114 | 8402      | -31742    |
| KL2408 | 8802      | -30718    |
| KL1052 | 8201      | -32255    |
| KL1002 | 8201      | -32255    |
| KL1702 | 8201      | -32255    |
| KL1154 | 8401      | -31743    |
| KL1104 | 8401      | -31743    |

#### Analogue I/O:

A 4-digit decimal value is presented.

This number represents the module version used.

Examples for analogue I/O modules:

| Module | Value |
|--------|-------|
| KL4004 | 4004  |
| KL3312 | 3312  |
| LK3202 | 3202  |
| KL3204 | 3204  |



The module check is only carried out when resetting the communication (parameter 7974 or 7984)

## 4. Parameter list

### Communication setup

#### 7930 CAN1 comm error

| No.  | Setting         |                | Min. setting | Max. setting     | Factory setting |
|------|-----------------|----------------|--------------|------------------|-----------------|
| 7931 | CAN1 comm error | Delay          | 2.0 s        | 600.0 s          | 10.0 s          |
| 7932 | CAN1 comm error | Relay output A | Not used     | Option dependent | R0 (none)       |
| 7933 | CAN1 comm error | Relay output B | Not used     |                  | R0 (none)       |
| 7934 | CAN1 comm error | Enable         | OFF          | ON               | OFF             |



GC-1F: Menu 7930 not available

#### 7940 CAN2 comm error

| No.  | Setting         |                | Min. setting | Max. setting     | Factory setting |
|------|-----------------|----------------|--------------|------------------|-----------------|
| 7941 | CAN2 comm error | Delay          | 2.0 s        | 600.0 s          | 10.0 s          |
| 7942 | CAN2 comm error | Relay output A | Not used     | Option dependent | R0 (none)       |
| 7943 | CAN2 comm error | Relay output B | Not used     |                  | R0 (none)       |
| 7944 | CAN2 comm error | Enable         | OFF          | ON               | OFF             |



AGC and BGC: If both options H8.x are present, an error on any of these will activate the alarms in 7930 and 7940.

#### 7970 CAN 1

| No.  | Setting |       | Min. setting             | Max. setting | Factory setting |
|------|---------|-------|--------------------------|--------------|-----------------|
| 7971 | CAN 1   | Type  | OFF<br>AOP-2<br>Beckhoff |              | OFF             |
| 7972 | CAN 1   | Baud  | 50 k<br>125 k<br>250 k   |              | 125 k           |
| 7973 | CAN 1   | ID    | 1                        | 64           | 1               |
| 7974 | CAN 1   | Reset | NO                       | YES          | NO              |



GC-1F: Menu 7970 not available



AGC: This menu is only activated if option H8.6 is activated.  
BGC: This menu is only activated if option H8.2 is activated.



AGC: AOP-2 selection in menu 7971 not available



Menu 7974 is for re-establishing communication after a fault/disconnection.



After changing type, the parameter list in the PC USW must be uploaded again.

#### 7980 CAN 2

| No.  | Setting |       | Min. setting             | Max. setting | Factory setting |
|------|---------|-------|--------------------------|--------------|-----------------|
| 7981 | CAN 2   | Type  | OFF<br>AOP-2<br>Beckhoff |              | OFF             |
| 7982 | CAN 2   | Baud  | 50 k<br>125 k<br>250 k   |              | 125 k           |
| 7983 | CAN 2   | ID    | 1                        | 64           | 1               |
| 7984 | CAN 2   | Reset | NO                       | YES          | NO              |



GC-1F: Menu 7981 and 7982 not available.



AGC: This menu is only activated if option H8.8 is activated.  
BGC: This menu is only activated if option H8.3 is activated.



AGC: AOP-2 selection in menu 7981 not available



Menu 7984 is for re-establishing communication after a fault/disconnection.



After changing type, the parameter list in the PC USW must be uploaded again.

#### 7950 KL320x Config

| No.  | Setting       |          | Type                      | Factory setting  |
|------|---------------|----------|---------------------------|------------------|
| 7951 | KL320x config | Module 1 | Pt100 (2/3-wire)          | Pt100 (2/3-wire) |
| 7952 | KL320x config | Module 2 | Pt1000 (2/3-wire)         |                  |
| 7953 | KL320x config | Module 3 | 10-3200 $\Omega$ (2-wire) |                  |
| 7954 | KL320x config | Module 4 | 10-1200 $\Omega$ (2-wire) |                  |



The above selections for KL 3202/3204 cannot be changed.



After changing module type, the parameter list in the PC USW must be uploaded again.

## External I/O setup

### Analogue inputs

#### 12000 Ext. an. in 1.1

| No.   | Setting         |                | Min. setting        | Max. setting     | Factory setting |
|-------|-----------------|----------------|---------------------|------------------|-----------------|
| 12000 | Ext. an. in 1.1 | Setpoint       | -20000              | 20000            | 10              |
|       |                 | Delay          | 2.0 s               | 600.0 s          | 10.0 s          |
|       |                 | Fail class     | ML-2 unit dependent |                  | Warning         |
|       |                 | Relay output A | Not used            | Option dependent | Not used        |
|       |                 | Relay output B | Not used            |                  | Not used        |
|       |                 | Enable         | OFF                 | ON               | OFF             |

#### 12010 Ext. an. in 1.2

| No.   | Setting        |                | Min. setting        | Max. setting     | Factory setting |
|-------|----------------|----------------|---------------------|------------------|-----------------|
| 12010 | Ext.an. in 1.2 | Setpoint       | -20000              | 20000            | 10              |
|       |                | Delay          | 2.0 s               | 600.0 s          | 10.0 s          |
|       |                | Fail class     | ML-2 unit dependent |                  | Warning         |
|       |                | Relay output A | Not used            | Option dependent | Not used        |
|       |                | Relay output B | Not used            |                  | Not used        |
|       |                | Enable         | OFF                 | ON               | OFF             |



Same order for settings 12030-12230.

### Analogue outputs



The external analogue outputs are used as transducer outputs in menu 5820 to 5970. Please refer to the option E+F option description.



GC-1F does not support analogue outputs.

### Digital inputs

#### 12540 Ext. dig. in 1

| No.   | Setting        |                | Min. setting        | Max. setting     | Factory setting |
|-------|----------------|----------------|---------------------|------------------|-----------------|
| 12540 | Ext. dig. in 1 | Delay          | 2.0 s               | 600.0 s          | 10.0 s          |
|       |                | Fail class     | ML-2 unit dependent |                  | Warning         |
|       |                | Relay output A | Not used            | Option dependent | Not used        |
|       |                | Relay output B | Not used            |                  | Not used        |
|       |                | Enable         | OFF                 | ON               | OFF             |



Same order for settings 12560 - 12690



**Digital outputs****12790 Ext. dig. out 1**

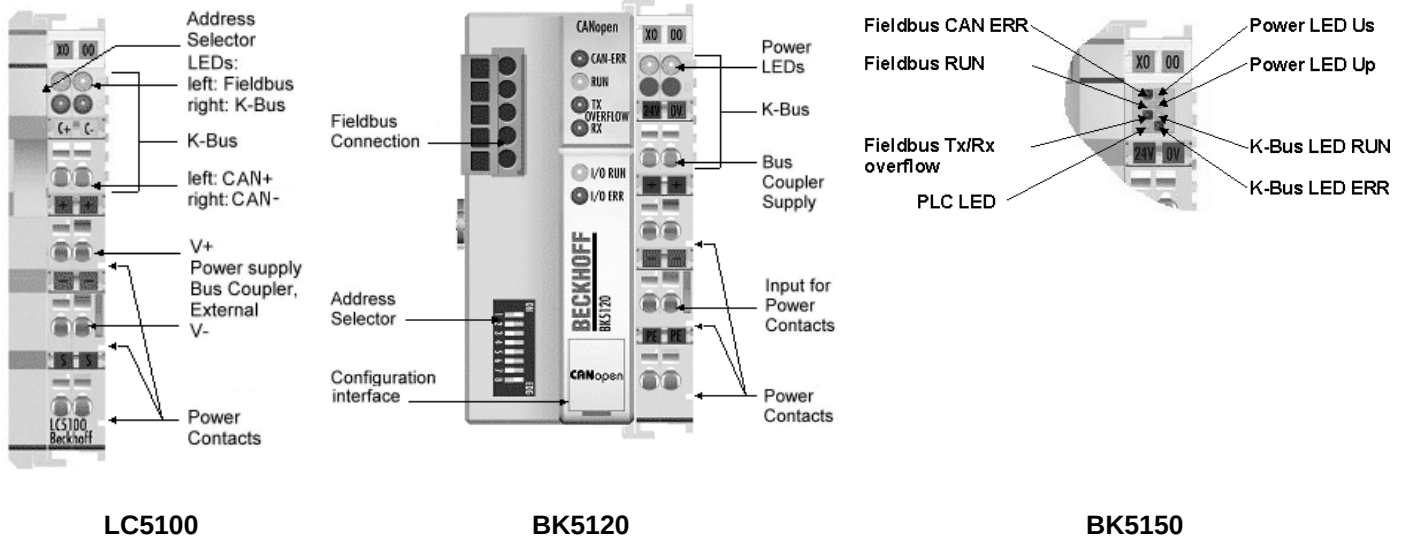
| No.   | Setting              |                | Min.<br>setting     | Max.<br>setting     | Factory<br>setting |
|-------|----------------------|----------------|---------------------|---------------------|--------------------|
| 12790 | Ext digital output 1 | Delay          | 2.0 s               | 600.0 s             | 10.0 s             |
|       |                      | Fail class     | ML-2 unit dependent |                     | Warning            |
|       |                      | Relay output A | Not used            | Option<br>dependent | Not used           |
|       |                      | Relay output B | Not used            |                     | Not used           |
|       |                      | Enable         | OFF                 | ON                  | OFF                |



Same order for settings 12810 – 12940.

## 5. Fault finding

### Beckhoff controllers



## Diagnostic LEDs

The Beckhoff Controllers has LEDs for display of status. They can be used for fault finding.

### CAN-ERR blink code

| CAN ERR                                                                            | Meaning                                                                                                                                                                                                                                                                                                                                                                                                |
|------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>off</b>                                                                         | CAN bus <b>has no errors</b>                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Fast blinking</b> (approx. 50ms on, approx. 50ms off; alternating with RUN LED) | Automatic baud rate detection has <b>not yet found a valid baud rate</b> . Not enough telegrams on the bus yet.                                                                                                                                                                                                                                                                                        |
| <b>1 x flash</b><br>(approx. 200ms on, 1s off)                                     | <b>CAN warning limit exceeded.</b> There are too many error frames on the bus. Please check the wiring (e.g. termination resistors, screens, conductor length, stubs). Other possible causes for exceeding the warning limit: there are no other participating devices in the network (occurs, for instance, when the first node is started).                                                          |
| <b>2 x blinking</b><br>(each approx. 200ms on, 200ms off, followed by a 1s pause)  | The <b>guarding or heartbeat monitor</b> has asserted, because either guarding telegrams or heartbeat telegrams are no longer being received.<br>Precondition for guarding monitoring: guard time and life time factors are > 0.<br>Precondition for heartbeat monitoring: consumer heartbeat > 0).<br>The Bus Coupler is pre-operational (PDOs switched off), and the outputs are in the error state. |
| <b>3 x blinking</b><br>(each approx. 200ms on, 200ms off, followed by a 1s pause)  | A <b>synchronisation error</b> has occurred. No sync. telegrams have been received during the set monitoring time (object 0x1006 x 1.5). The bus node is pre-operational (PDOs switched off), and the outputs are in the error state.                                                                                                                                                                  |
| <b>4 x blinking</b><br>(each approx. 200ms on, 200ms off, followed by a 1s pause)  | <b>Event timer error:</b> The Bus Coupler has not received an RxPDO within the set event time (0x1400ff sub-index 5). The bus node is pre-operational (PDOs switched off), and the outputs are in the error state.                                                                                                                                                                                     |

### RUN blink code

| RUN                                                                                    | Meaning                                                                                                         |
|----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
| <b>off</b>                                                                             | Firmware status < C0: Bus node is in <b>stopped state</b> . No communication is possible with SDO or PDO.       |
| <b>Fast blinking</b> (approx. 50ms on, approx. 50ms off; alternating with CAN ERR LED) | Automatic baud rate detection has <b>not yet found a valid baud rate</b> . Not enough telegrams on the bus yet. |
| <b>1 x blinking</b> (approx. 200 ms on, 1 s off)                                       | Bus node is in <b>stopped state</b> . No communication is possible with SDO or PDO.                             |
| <b>Blinking cyclically</b> (approx. 200 ms on, 200 ms off)                             | Bus node is in <b>pre-operational state</b> . The node has not yet started.                                     |
| <b>on</b>                                                                              | Bus node is in <b>Operational state</b> .                                                                       |

**Tx overflow blink code**

| <b>Tx Overflow</b>                                            | <b>Meaning</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>on</b>                                                     | A <i>transmit queue overflow</i> has occurred. The bus coupler could not send its messages. Cause: e.g. excessive bus loading. A bus coupler reset must be carried out.                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Blinking cyclically</b><br>(approx. 200 ms on, 200 ms off) | Logical Tx queue overflow: SYNC interval too short. The coupler could not deliver all the TxPDOs before the following SYNC telegram. The TxPDOs are then, for instance, delivered in every second SYNC interval. Remedy: Lengthen the SYNC interval or raise the transmission type. In some cases it may be appropriate to reduce the I/O count at this bus station (e.g. by moving I/Os to the neighbouring station)<br><br>Note: The logical Tx queue overflow is signalled for approx. 10 sec and then reset. If it keeps recurring, signalling is maintained. |

**Rx overflow blink code**

| <b>Rx Overflow</b>                                            | <b>Meaning</b>                                                                                                                                                                                                                                                                                                                      |
|---------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>on</b>                                                     | A <i>receive queue overflow</i> has occurred. The Bus Coupler loses messages.<br><br>Cause: e.g. bursts of short telegrams. A bus coupler reset must be carried out.                                                                                                                                                                |
| <b>Blinking cyclically</b><br>(approx. 200 ms on, 200 ms off) | A <i>receive queue overflow</i> has occurred. The Bus Coupler has lost messages, but the overflow condition is no longer current. Cause: e.g. bursts of short telegrams, perhaps during a status transition (e.g. very short SYNC interval during transition after operational).<br>Signalling is reset during a Bus Coupler reset. |

**K-Bus LEDs (local errors)**

Two LEDs, the K-Bus LEDs, indicate the operational state of the Bus Terminals and the connection to these Bus Terminals. The green LED (I/O RUN) lights up in order to indicate fault-free operation. The red LED (I/O ERR) flashes with two different frequencies in order to indicate an error. The errors are displayed in the blink code in the following way:

**Blink code**

| <b>Fast blinking</b>        | <b>Start of the error code</b>  |
|-----------------------------|---------------------------------|
| <b>First slow sequence</b>  | Error code                      |
| <b>Second slow sequence</b> | Error argument (error location) |

**Error type**

| Error code                             | Error code argument | Description                                                   | Remedy                                                                                                                                                                                                                                               |
|----------------------------------------|---------------------|---------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Persistent, continuous flashing</b> |                     | general K-bus error                                           | - Check terminal strip                                                                                                                                                                                                                               |
| <b>1 pulse</b>                         | 0                   | EEPROM checksum error                                         | - Set manufacturer's setting with the KS2000 software<br>- Connect fewer terminals; too many entries in the table for the programmed configuration<br>- Software update required for the coupler                                                     |
|                                        | 1                   | Inline code buffer overflow                                   |                                                                                                                                                                                                                                                      |
|                                        | 2                   | Unknown data type                                             |                                                                                                                                                                                                                                                      |
| <b>2 pulses</b>                        | 0                   | Programmed configuration incorrect table entry/ Bus Coupler   | - Check programmed configuration for correctness<br>- Incorrect table entry/Bus Coupler                                                                                                                                                              |
|                                        | (n>0)               | Incorrect table comparison (terminal n)                       |                                                                                                                                                                                                                                                      |
| <b>3 pulses</b>                        | 0                   | K-Bus command error                                           | - No terminal connected; attach terminals.<br>- One of the terminals is defective; halve the number of terminals attached and check whether the error is still present with the remaining terminals. Repeat until the defective terminal is located. |
| <b>4 pulses</b>                        | 0<br>n              | K-Bus data error, break behind Bus Terminal n                 | Check whether the n+1 terminal is correctly connected; replace if necessary.<br>- Check whether the end terminal 9010 is connected.                                                                                                                  |
| <b>5 pulses</b>                        | n                   | K-Bus error during register communication with Terminal       | Replace terminal n.                                                                                                                                                                                                                                  |
| <b>7 pulses</b>                        | n                   | BK5110 or LC5110: unsupported terminal detected at location n | Only use digital terminals or Bus Coupler BK5120                                                                                                                                                                                                     |

All information regarding error codes are related to the documentation from:  
<http://www.beckhoff.com/>

DEIF A/S reserves the right to change any of the above