




Bewertungs- und Evaluierungsbericht

Assessment and Evaluation report

Nr. /No. 557 / Ex 8226.02 / 18

Baumusterprüfung für Geräte und Komponenten zur Verwendung in explosionsgefährdeten Bereichen (Richtlinie 2014/34/EU)

Type examination for equipment and components intended for use in
potentially explosive atmospheres (Directive 2014/34/EU)

Gegenstand: Gerät / Typ Subject: Equipment / Type	K-Factor Display
Hergestellt und zur Prüfung vorgelegt Manufactured and submitted for examination	Compac Industries Ltd
Anschrift Address	52 Walls Road, Penrose, Auckland, New Zealand
Verwendete Normen Standard basis	EN IEC 60079-0:2018 EN 60079-11:2012
Schutzartenkennzeichen Code for type of protection	 II 2 G Ex ib IIA T4 Gb (-40°C ≤ Ta ≤ +70°C)
Angebotsnummer Offer number	ExTC job 21080 With TÜV Rheinland offer 268826124
Auftragsnummer der Prüfstelle / Region Testing station / region order number	ExTL: 268826124-200
Auftragsnummer der Zertifizierungsstelle Order number of ExCB	ExNB: 268826124-300
Zeitraum der Prüfung Period of Testing	2022-02-28 bis/to 2023-06-15

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1. Gegenstand und Typ / Subject and type

K-Factor Display

2. Allgemeine Produktbeschreibung / General product information

The K-Factor Display comprises a CI502 K-Factor Board, with either a CI252 or CI253 LCD Panel PCB directly mounted to the K-Factor Board, and up to two totalisers, all housed in a plastic enclosure with a polycarbonate front cover. The LCD backlights may be dimmed by the control Board. A metal bracket used to mount the totaliser is accessible from outside the plastic enclosure. The front display panel has an anti-static film applied. The equipment may include a CI515 Preset Board with one or two 4 x 4 membrane keypads.

The K-Factor Display is designed to form part of an intrinsically safe control system and is powered via the BUS-IN connector J1. Connections are provided for 5V and 9V IS power supplies, common ground and RS485 communications. The K-Factor Display provides three BUS-OUT connectors J2, J3 and J4 which are directly connected to BUS-IN connector J1 (though the pin numbers on J1 for the various circuits are not the same as the pin numbers on J2, J3, J4) for through connected 5V and 9V IS supplies, common ground and RS485 communications. J5 is not fitted.

In addition to the BUS-IN and BUS OUT connectors, the K-Factor Board (CI502) provides:

- connectors J10 and J20 for two COM Meters (separately certified, refer TÜV 18 ATEX 8225X) with up to 50m cable,
- connectors J11 to J14 and J21 to J24 for eight simple switches (such as nozzle switches, air-detector switches, stop switches, Hi/Lo selector switches,
- connector J30 for two totalizers mounted internal to the enclosure, and
- connector J8 for a piezo buzzer mounted on the board itself.

Details der Änderungen / Details of change:

- Several changes have been made in the circuitry of the Main Board CI502 and the LCD Board CI252.
- Compliance has been assessed to the more recent Standards EN IEC 60079-0:2018; EN 60079-11:2012
- Update of the "Special Conditions of Use".

For internal use:

This is a takeover from IECEx. The related IECEx test report is AU/EXTC/ExTR21.0034/01.

3. Dokumentation des Herstellers / Manufacturer's documents

Reg-Nr./ Reg. no.	Dokumententitel/ Document title:	Dokumenten-Nr./ Document no.:	Rev./ Rev.:	Datum/ Date:
1.	C5000 Displays 7 Digit Display Panel Housing Assembly	ASM0143D	D	2019-03-15
2.	C5000 Control Unit Labels	AP392	C	2020-02-07

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	K-Factor Displays			
3.	*Installation & Safety Data for K-Factor Display	AP397	C	2021-02-22
4.	BUS Cable for Pre-set (CI515-J100)	AP411	A	2019-03-21
	CI502			
5.	*CI502 C5K K-Factor Board (Schematics)	CI502	D	2021-02-18
6.	*C5000 K-Factor Board (Top Overlay)	CI502	D	2021-02-19
7.	*C5000 K-Factor Board (Top Layer)	CI502	D	2021-02-19
8.	*C5000 K-Factor Board (Bottom Layer)	CI502	D	2021-02-19
9.	*CI502P-D CP-C5K-KFACT (BOM)	CI502P	D	2021-02-19
	CI252			
10.	*LCD PANEL LAYOUT1 (Schematic)	CI252	F	2021-03-04
11.	*LCD PANEL LAYOUT1 (Top Overlay)	CI252	F	2021-03-04
12.	*LCD PANEL LAYOUT1 (Top Layer)	CI252	F	2021-03-04
13.	*LCD PANEL LAYOUT1 (Bottom Layer)	CI252	F	2021-03-04
14.	*LCD PANEL LAYOUT1 (Bottom Overlay)	CI252	F	2021-03-04
15.	*CI252P-F CP-C5K-DSPLY7D1 (BOM)	CI252P	F	2021-03-04
	CI253			
16.	LCD PANEL LAYOUT2 (Schematic)	CI253	C	2019-08-15
17.	LCD PANEL LAYOUT2 (Top Overlay)	CI253	C	2019-08-15
18.	LCD PANEL LAYOUT2 (Top Layer)	CI253	C	2019-08-15
19.	LCD PANEL LAYOUT2	CI253	C	2019-08-15

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	(Bottom Layer)			
20.	LCD PANEL LAYOUT2 (Bottom Overlay)	CI253	C	2019-08-15
21.	CI253P-C CP-C5K-DSPLY7D2 (BOM)	CI253P	C	2019-08-15
	CI515			
22.	C5000 Preset (Schematic)	CI515	A	2018-04-06
23.	C5000 Preset Board (Top Overlay)	CI515	A	2018-04-06
24.	C5000 Preset Board (Top Layer)	CI515	A	2018-04-06
25.	C5000 Preset Board (Bottom Layer)	CI515	A	2018-04-06
26.	CI515P-A CP-C5K-PSET (BOM)	CI515P-A	A	2019-05-31

Tabelle / Table 1

Hinweis/ Note:

Ein * vor dem Dokumententitel markiert Dokumente, die neu oder überarbeitet sind.
A * in front of the document title marks documents which are new or revised.

Prüfmuster / Test sample

Seriennummer/ Serialnumber	Prüfdatum Date inspection
Nil	

Tabelle/Table 2

4. Technische Daten / Technical data

Elektrische Daten/ Electrical data

See cl. 8.

Nominal input voltage 5V and 9V

Umgebungsdaten/ Environmental data

Tamb -40°C ≤ Ta ≤ +70°C

Liste der verwendeten Geräte und Komponenten / List of used equipment and components

Gerät/ Device	Hersteller/ Manufacturer	Typ/ Type	Ex-Kennzeichnung/ Ex-Marking	Bescheinigung-Nr./ Certificate no.
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Nil				
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Tabelle / Table 3

5. Prüfumfang / Scope of testing

The ATEX version equipment was assessed for compliance to the equivalent IEC Standards and test reports listed in Section 10.

6. Kennzeichnung / Marking

The marking (clearly visible, legible and permanent) comprises the following statements:

- CE-mark and the number of the notified body, who is involved in the factory inspection. SGS ATEX 0598
- Name and address of the manufacturer Compac Industries Ltd
- Manufacturer's type identification K-Factor Display
-  **II 2 G Ex ib IIA T4 Gb (-40 °C ≤ Ta ≤ 70 °C)**
- Certification numbers TÜV 18 ATEX 8226 X
- Serial number
- Year of production
- Technical data

7. Stückprüfungen / Routine tests

Es sind keine Stückprüfungen nach zuvor genannten Normen notwendig.
No routine tests according to above mentioned standards required.

Norm / standard	Nr. / no.	Test / test
		Nil

Tabelle / Table 4



8. Auflagen / Bedingungen für die sichere Verwendung
Special conditions for safe use

1. The following input and output parameters were determined for the various connectors to external equipment on the K-Factor Display and must be taken into account during interconnection:

K-Factor Board (CI502)	
Connector J1 (BUS-IN) <small>see Note 1</small>	
5V & RS485	Pins 1, 2 & 6 w.r.t. Pins 3, 4, 5 & 7
U _i	6V
I _i	235mA <small>see Note 2</small>
P _i	1.05W <small>see Note 2</small>
L _i	100µH <small>see Note 2</small>
C _i	310µF <small>see Note 2</small>
I _o	5mA <small>see Note 3</small>
P _o	7mW <small>see Note 3</small>
9V	Pin 8 w.r.t. Pins 3, 4, 5 & 7
U _i	10V
I _i	1A
P _i	-
L _i	0µH
C _i	0µF

Preset Board (CI515)	
Connector J100 (BUS-IN) <small>see Note 1</small>	
5V & RS485	Pins 1, 2 & 6 w.r.t. Pins 3, 4, 5 & 7
U _i	6V
I _i	235mA
P _i	1.05W
L _i	1µH
C _i	8µF
9V	Pin 8 w.r.t. Pins 3, 4, 5 & 7
U _i	10V
I _i	1A
P _i	10W
L _i	0µH
C _i	0µF



K-Factor Board (CI502) with Preset Board (CI515) installed Connector J1 (BUS-IN) <small>see Note 1</small>	
5V & RS485	Pins 1, 2 & 6 w.r.t. Pins 3, 4, 5 & 7
U _i	6V <small>see Note 2</small>
I _i	235mA <small>see Note 2</small>
P _i	1.05W <small>see Note 2</small>
L _i	100µH <small>see Note 2</small>
C _i	318µF <small>see Note 2</small>
I _o	5mA <small>see Note 3</small>
P _o	7mW <small>see Note 3</small>
9V	
Pin 8 w.r.t. Pins 3, 4, 5 & 7	
U _i	10V
I _i	1A
P _i	10W
L _i	0µH
C _i	0µF

Note 1: Connectors J2, J3 and J4 (BUS-OUT) are connected in parallel to J1 in the K-Factor Board and connector J101 (BUS-OUT) is connected in parallel to J100 in the Preset Board, and hence have the same parameters, with the pin numbers allocated as follows:

Circuit reference	J1/J100 Pin #	J2, J3, J4/J101 Pin #
9V	8	6
5V	2	3
A	6	8
B	1	4
Earth, Screen	3, 4, 5, 7	1, 2, 5, 7, 9, 10

Note 2: The supply to connectors J10, J20 are directly connected to this J1 pin 2. Hence the load connected at J10, J20 must be accounted for and added to J1 parameters when connecting in a system. Currently the I_o and C_o for J10, J20 have been allocated the values of 50µH and 300µF, and these have been reflected in the L_i and C_i values of J1 of the K-Factor Board CI502 by itself, and also with the Preset board CI515 installed.

Note 3: The terminals on the 5V circuit may be considered under fault to be connected to an internal source of supply due to a supercapacitor that may charge up to the applied U_i but is limited by internal resistance to provide the I_o and P_o shown in this table. This needs to be accounted for when connecting in a system.

Connectors J10 and J20 Typically for connection of Meters and Encoders	
5V Output	Pins 1 – 10 (combined parameters for J10/J20)
U _o	6 V <small>see Note 2 above</small>
I _o	235 mA <small>see Note 2 above</small>
P _o	1.05 W <small>see Note 2 above</small>
L _o	50 µH <small>see Note 2 above</small>
C _o	300 µF <small>see Note 2 above</small>

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Connectors J11, J12, J13, J14, J21, J22, J23, J24 Typically for connection of simple apparatus (switches)	
5V Output	Pin 1 w.r.t. Pin 2 (all connectors considered in parallel)
U _o	6 V
I _o	5.2 mA
P _o	8 mW
L _o	100 µH
C _o	1 µF

Preset Board (CI515) Connectors J200, J201 Membrane Keypad	
U _o	6 V
I _o	5.6 mA
P _o	8.4 mW
L _o	10 µH
C _o	0.1 µF

2. The rear of the display housing is a potential antistatic hazard and is provided with a warning label. The rear of the enclosure shall only be cleaned with a damp cloth.
3. Simple switches shall be rated at least 10Vdc, 10mA, 0.1VA. The switches and associated wiring shall be subjected to a dielectric strength test in accordance with clause 6.3.13 and 10.3 of EN 60079-11:2012 as required for the insulation between the intrinsically safe circuit and other intrinsically safe circuits, non-intrinsically safe circuits, and the frame of the electrical equipment.
4. The Preset Board and keypad shall have insulation between the intrinsically safe circuit and other intrinsically safe circuits, non-intrinsically safe circuits, and the frame of the electrical equipment, and shall be subjected to a dielectric strength test in accordance with clause 6.3.13 and 10.3 of EN 60079-11:2012.
5. The BUS cable should only be supplied by Compac Industries Ltd. These cables need to maintain separation between I.S. circuits and should not be modified. The BUS cables may be of various lengths with the condition that the total length of all the BUS cables must be less than 33m.
6. All cabling connected to the K-Factor Display shall be securely fixed and effectively protected against damage.

9. **Sicherheitstechnisch relevante Informationen / Safety relevant information**

Die Kenntnis der Technische Daten und der aufgeführten Auflagen/ Bedingungen für die sichere Verwendung (siehe Abschnitt 4 und 8) sowie der Betriebsanleitung ist für die sichere Verwendung erforderlich.

The information given under Technical data and Special conditions for safe use (see clause 4 and 8) as well as in the manufacturer's instructions has to be observed.

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10. Prüfergebnisse aus Laboren / Test results from laboratories

Reportnummer/ Report no.	Laborprüfung/ Type test	Labor/ Laboratory	Datum/ Date
AU/ExTC/ExTR21.0034/01	Several tests as detailed in the report	IECEX test Laboratory Ex Testing and Certification Pty Ltd	2023-06-13

Tabelle / Table 5

Siehe Listing der Checklisten / Prüfprotokolle im Anhang zu diesem Bericht:
See listing of checklists/ Lab test reports annexed to this report:

Anlage/ Annex	Checkliste/ Checklist	Seiten/ Pages
1.	Checklist Annex II of Directive 2014/34/EU	5
2.	AU/ExTC/ExTR21.0034/01 - IEC 60079-0:2017 - IEC 60079-11:2011	53

Tabelle / Table 6

Hinweis/ Note:

Die Anforderungen der verwendeten EN Normen sind identisch mit den entsprechenden IEC Normen des IECEX ExTR Pakets.

The requirements of the applied EN standards are identical to the equivalent IEC standards of the IECEX ExTR package.



TÜV Rheinland Industrie Service GmbH
Zertifizierungsstelle für Explosionsschutz
Am Grauen Stein
D – 51105 Köln

Köln, den 16.06.2023
Cologne,

Erstellt von / Compiled by

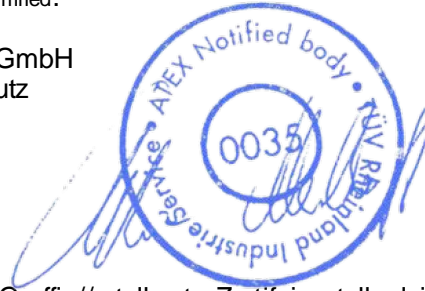
M.Sc. Steffen Kruse

Geprüft von / Reviewed by

Dr.-Ing. Angela Lilienthal

Der Anhang II der Richtlinie 2014/34/EU ist erfüllt
The Annex II of Directive 2014/34/EU is fulfilled.

TÜV Rheinland Industrie Service GmbH
Zertifizierungsstelle für Explosionsschutz
Certification body for explosion protection



Köln, den 20.06.2023
Cologne,

Christian Mehrhoff

Zertifizierungsstellenleiter: Klauspeter Graffi // stellvertr. Zertifizierungsstellenleiter: Andreas Maschke
Head of certification body: Klauspeter Graffi // Deputy of certification body: Andreas Maschke

The proforma for this report is available at QMA-HAE-08-560 dated 2023-02-01

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