Integrated PLC Imtech Bridge Guard

IBG-PLCi 214-2-1-1

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References

IMO Res.A.694(17), MSC.128(75), MSC.191(79), IEC 60945 (2002) inc. corr.1 (2008), IEC 61162 Series, IEC 62288 Ed.2.0 (2008), IEC 62616 (2010) , IEC 61696-1 IEC FDIS Ed.2 TC80-690 FDIS VDR, IEC 61924-2 NEN-EN-IEC Ed.1 2012-12

Introduction

The integrated PLC consists of the basic, stand-alone Wago with the appropriate modules to incorporate all the necessary functionality for the BNWAS. This is the basic PLC as needed for BNWAS and as described in IBG-PLC 214-2-0-1. The panels, buttons, VDR-messages etc. are all derived from within the wago. If there is power supply needed for attached equipment, it will be supplied directly from the Wago.

Abbreviations list

PLC	Programmable Logical Controller
BNWAS	Bridge Navigational Watch Alarm System

1. The PLC basics

The basic wago will consist of the following modules as seen in the overview (see Figure 1-1). This will be the basic PLC and Filter module that are always at the beginning of the complete Wago-PLC. This will consist of the following modules:

1* 750-881 the PLC or “Controller”
1* 750-626 the filter module

After the filter module and before the BNWAS composition it can consist of merely any Wago-module that is available and which are all type-approved (Bureau Veritas Certificate number 13453/C0 BV).

At the end of the last added module, the rest of the composed BNWAS-modules (as described in IBG-PLC 214-2-0-1) will be added.

: The composed BNWAS modules start with a 750-610 module, which is a power supplied module with an alarm-fuse function. This means that if any of the modules before this one breaks down, the remaining modules after this 750-610 module still will be able to function without any interruption. This makes it possible to combine the BNWAS composition with merely every other available Wago module.

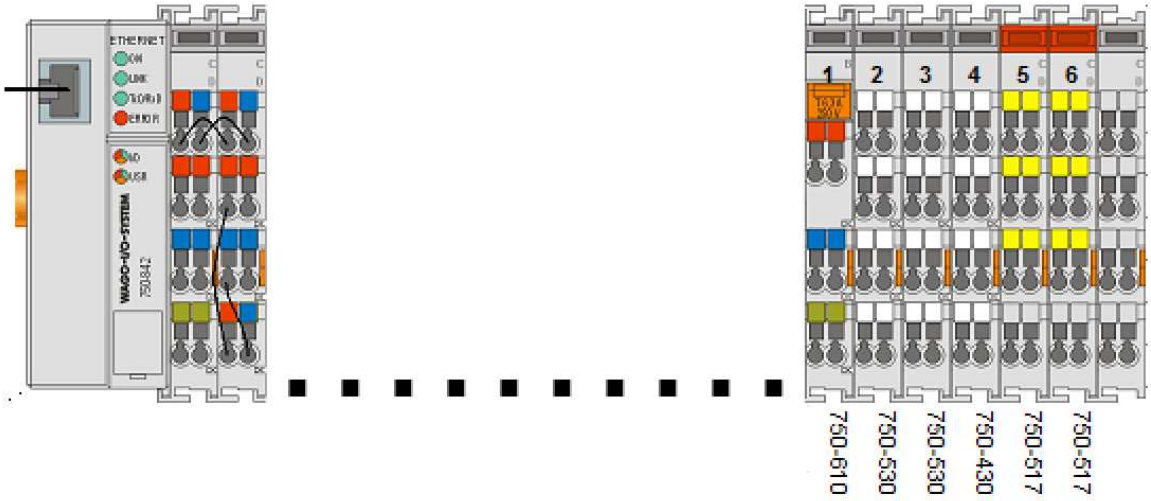


Figure 1-1: PLC basic overview

: Of course we can start with the standard BNWAS modules and place any other module behind it. The test solution will be approved with this method. Nonetheless both methods will be part of the type approval.

2. PLC examples “Typical”

In the following figures (see Figure 2-1 and Figure 2-2) we show some typical combinations against which we can test the composition. Nonetheless the modules are not limited to the ones showed in these examples. Every “approved” wago module can be used without any restriction.

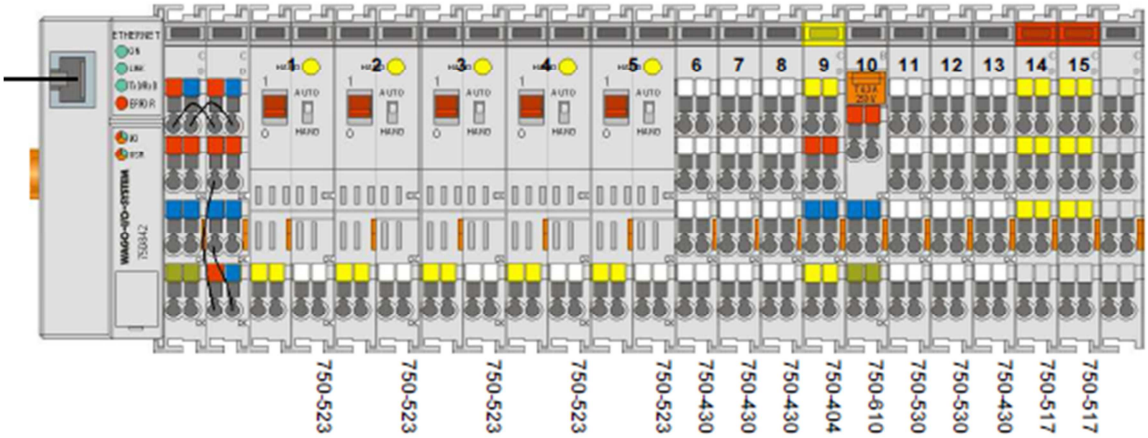


Figure 2-1: Typical set-up 1

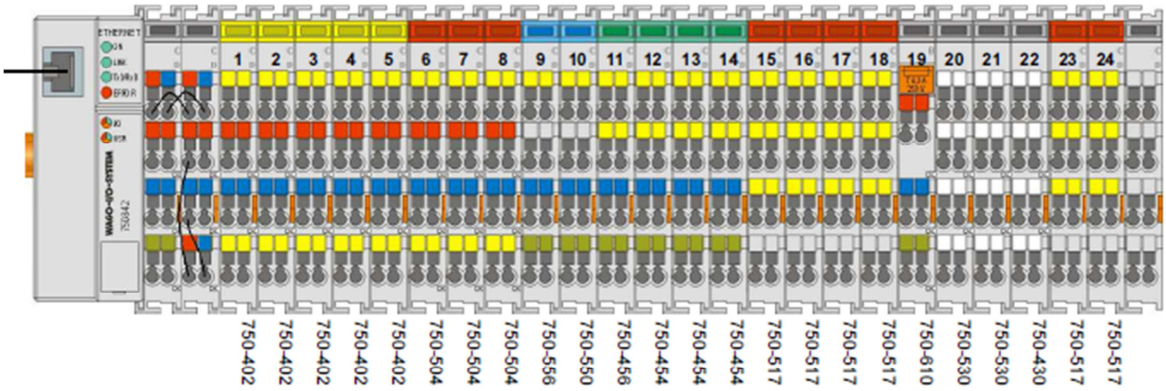


Figure 2-2: Typical set-up 2

: The test for the Type approval will be taken with the then available modules. The type approval certificate will be considered as taken with every available Wago module.

3. PLC split in two

When the cabins in the 2nd and 3rd stage are too far off, it might be necessary to split the basic PLC in two pieces. One basic and one for the 2nd and 3rd stage cabins.

You will get the following division in the wago PLC's:

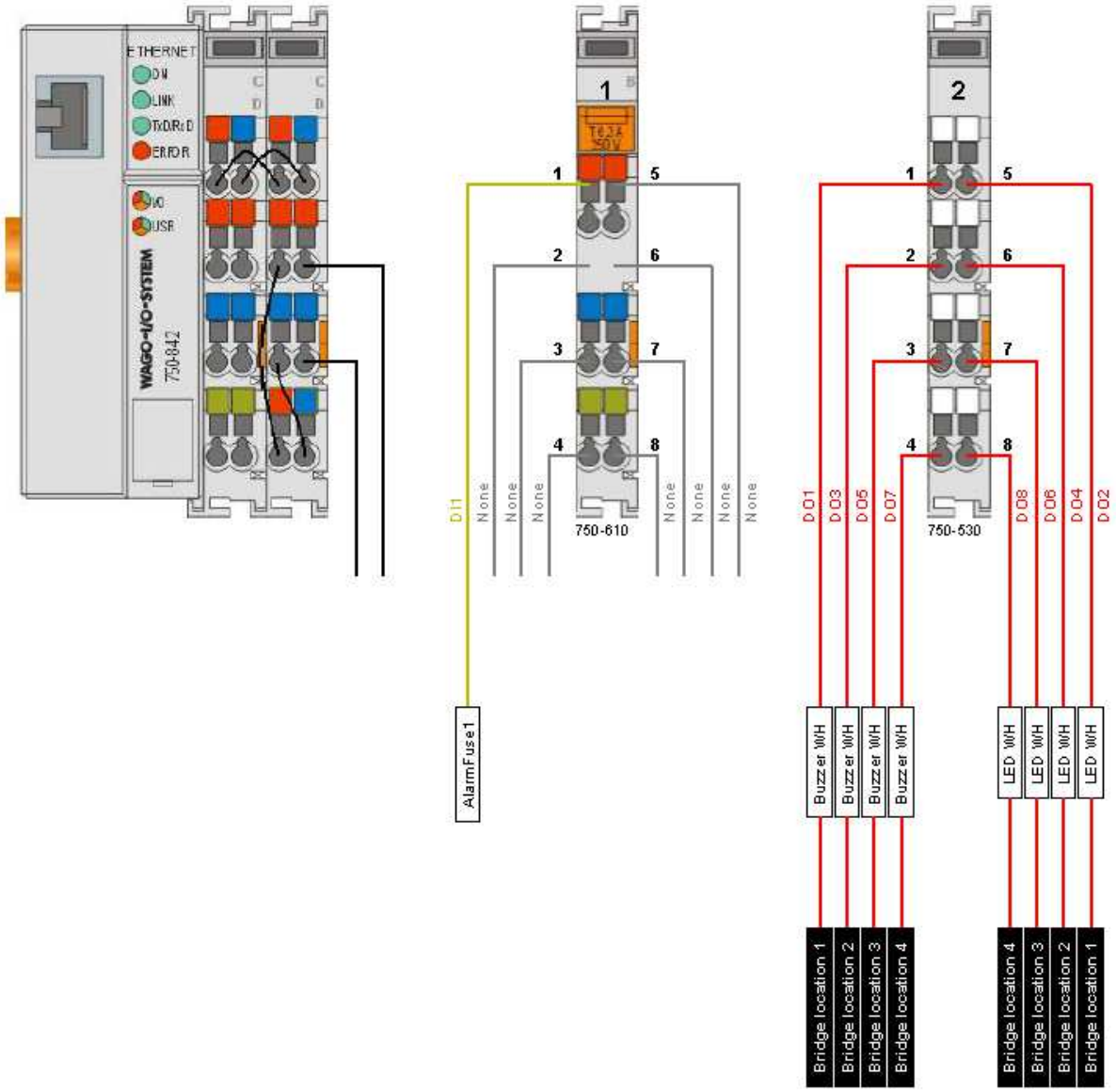


Figure 3-1: Wago PLC 1st stage and alarms 1

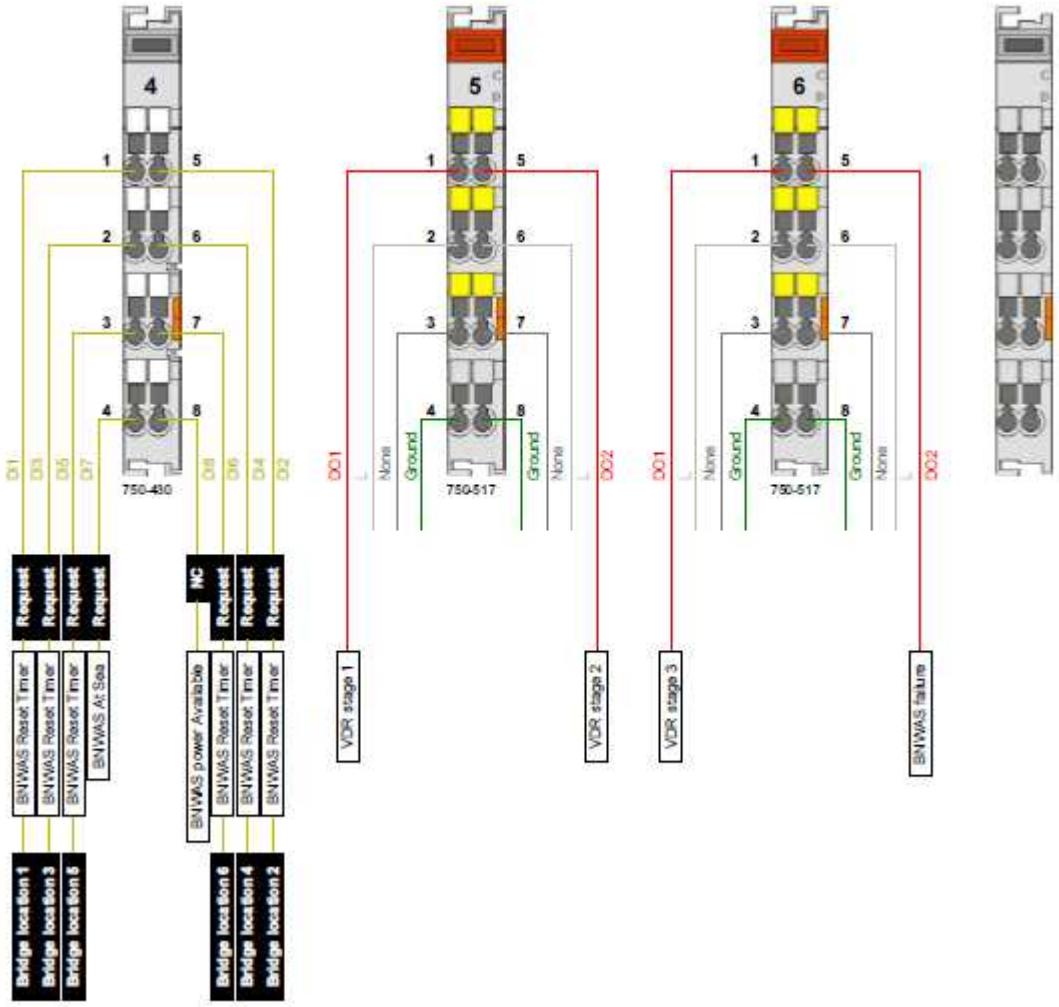


Figure 3-2: Wago PLC 1st stage and alarms 2

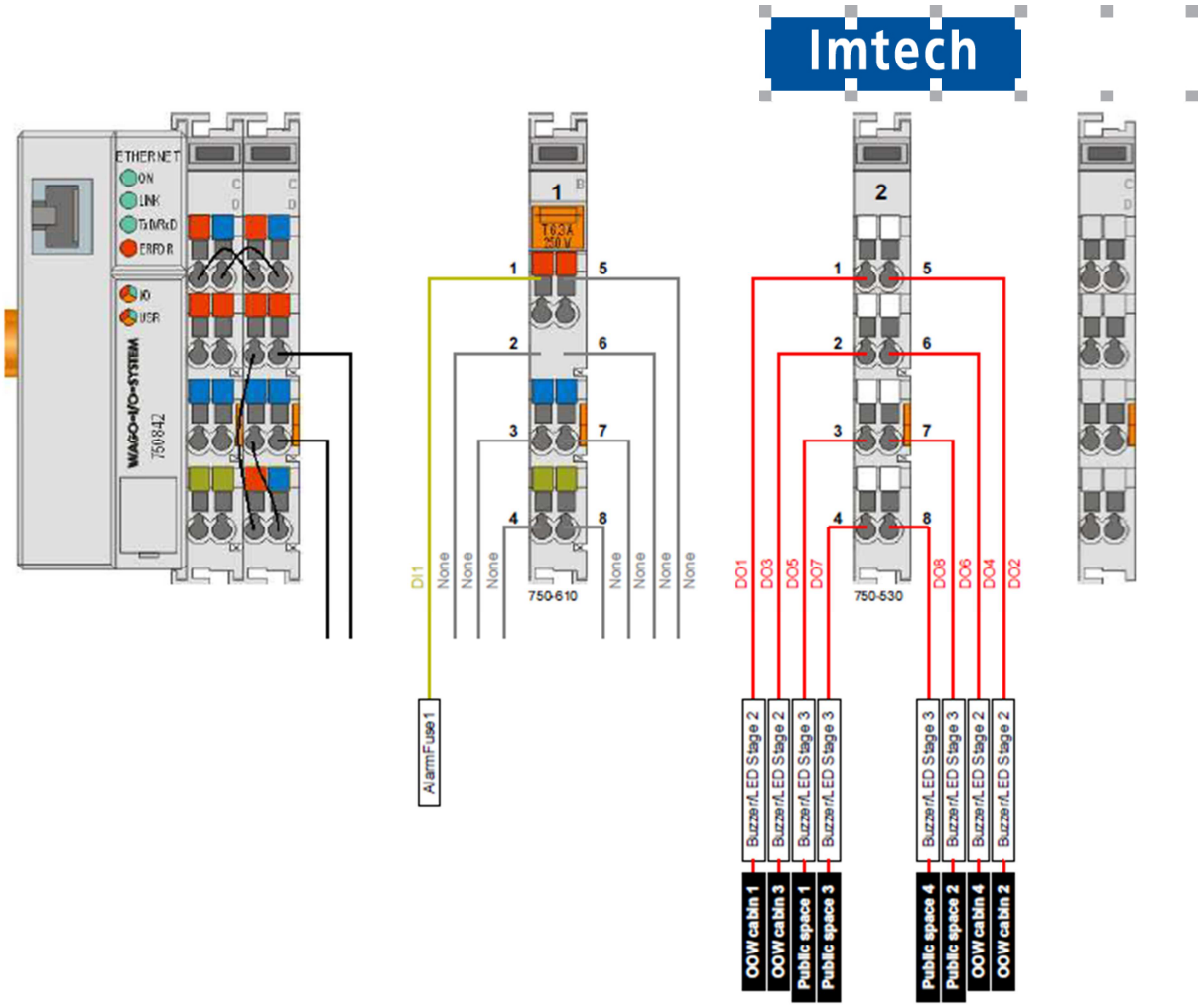


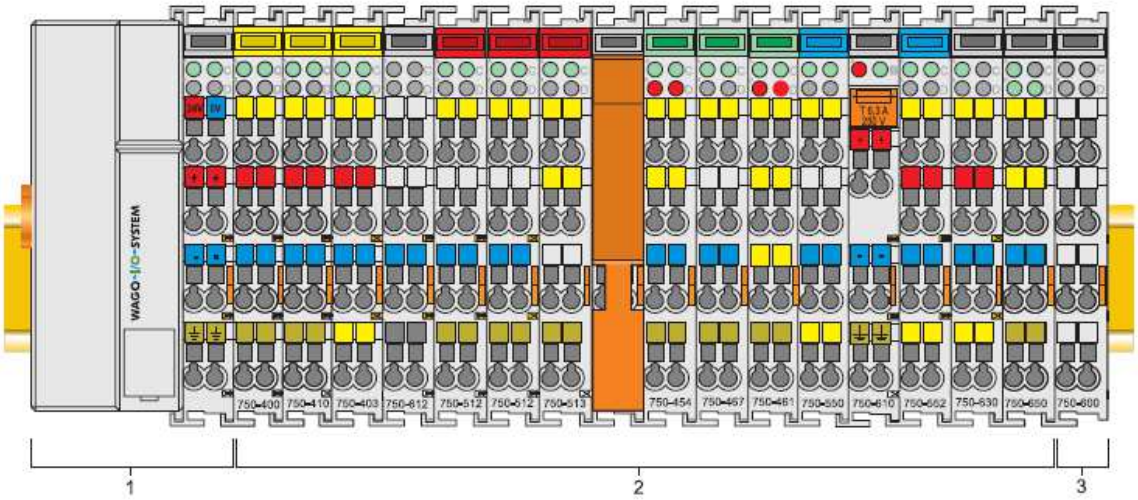
Figure 3-3: Wago PLC 2nd and 3rd stage

4. Annex 1

4.1 Wago 750 series specifications

4.1.1 System Description

The WAGO-I/O-SYSTEM 750 is a modular, fieldbus independent I/O system. It is comprised of a fieldbus coupler/controller (1) and connected fieldbus modules (2) for any type of signal. Together, these make up the fieldbus node. The end module (3) completes the node.



Couplers/controllers for fieldbus systems such as PROFIBUS, INTERBUS, ETHERNET TCP/IP, CAN (CANopen, DeviceNet, CAL), MODBUS, LON and others are available.

The coupler/controller contains the fieldbus interface, electronics and a power supply terminal. The fieldbus interface forms the physical interface to the relevant fieldbus. The electronics process the data of the bus modules and make it available for the fieldbus communication. The 24 V system supply and the 24 V field supply are fed in via the integrated power supply terminal.

The fieldbus coupler communicates via the relevant fieldbus. The programmable fieldbus controller (PFC) enables the implementation of additional PLC functions. Programming is done with the WAGO-I/O-PRO 32 in accordance with IEC 61131-3.

Bus modules for diverse digital and analog I/O functions as well as special functions can be connected to the coupler/controller. The communication between the coupler/controller and the bus modules is carried out via an internal bus.

The WAGO-I/O-SYSTEM 750 has a clear port level with LEDs for status indication, insertable mini WSB markers and pullout group marker carriers. The 3-wire technology supplemented by a ground wire connection allows for direct sensor/actuator wiring.

4.1.2 Technical Data

Mechanic	
Material	Polycarbonate, Polyamide 6.6
Dimensions W x H* x L * from upper edge of DIN 35 rail - Coupler/Controller (Standard) - Coupler/Controller (ECO) - Coupler/Controller (FireWire) - I/O module, single - I/O module, double - I/O module, fourfold	 - 51 mm x 65 mm x 100 mm - 50 mm x 65 mm x 100 mm - 62 mm x 65 mm x 100 mm - 12 mm x 64 mm x 100 mm - 24 mm x 64 mm x 100 mm - 48 mm x 64 mm x 100 mm
Installation	on DIN 35 with interlock
modular by	double featherkey-dovetail
Mounting position	any position
Marking	marking label type 247 and 248 paper marking label 8 x 47 mm
Connection	
Connection type	CAGE CLAMP®
Wire range	0.08 mm² ... 2.5 mm², AWG 28-14
Stripped length	8 – 9 mm, 9 – 10 mm for components with pluggable wiring (753-xxx)
Contacts	
Power jumpers contacts	blade/spring contact self-cleaning
Current via power contacts$_{max}$	10 A
Voltage drop at I_{max}	< 1 V/64 modules
Data contacts	slide contact, hard gold plated 1.5 µm, self-cleaning
Climatic environmental conditions	
Operating temperature	0 °C ... 55 °C, -20 °C ... +60 °C for components with extended temperature range (750-xxx/025-xxx)
Storage temperature	-20 °C ... +85 °C
Relative humidity	5 % to 95 % without condensation
Resistance to harmful substances	acc. to IEC 60068-2-42 and IEC 60068-2-43
Maximum pollutant concentration at relative humidity < 75%	$SO_2 \leq 25$ ppm $H_2S \leq 10$ ppm
Special conditions	Ensure that additional measures for components are taken, which are used in an environment involving: – dust, caustic vapors or gasses – ionization radiation.

Safe electrical isolation				
Air and creepage distance	acc. to IEC 60664-1			
Degree of pollution acc. To IEC 61131-2	2			
Degree of protection				
Degree of protection	IP 20			
Electromagnetic compatibility				
Immunity to interference for industrial areas acc. to EN 61000-6-2 (2001)				
Test specification	**Test values**		**Strength class**	**Evaluation criteria**
EN 61000-4-2 ESD	4 kV/8 kV (contact/air)		2/3	B
EN 61000-4-3 electromagnetic fields	10 V/m 80 MHz ... 1 GHz		3	A
EN 61000-4-4 burst	1 kV/2 kV (data/supply)		2/3	B
EN 61000-4-5 surge	Data:	-/- (line/line)		B
		1 kV (line/earth)	2	
	DC supply:	0.5 kV (line/line)	1	B
		0.5 kV (line/earth)	1	
	AC supply:	1 kV (line/line)	2	B
		2 kV (line/earth)	3	
EN 61000-4-6 RF disturbances	10 V/m 80 % AM (0.15 ... 80 MHz)		3	A
Emission of interference for industrial areas acc. to EN 61000-6-4 (2001)				
Test specification	**Limit values/[QP]*)**	**Frequency range**	**Distance**	
EN 55011 (AC supply, conducted)	79 dB (µV)	150 kHz ... 500 kHz		
	73 dB (µV)	500 kHz ... 30 MHz		
EN 55011 (radiated)	40 dB (µV/m)	30 MHz ... 230 MHz	10 m	
	47 dB (µV/m)	230 MHz ... 1 GHz	10 m	
Emission of interference for residential areas acc. to EN 61000-6-3 (2001)				
Test specification	**Limit values/[QP]*)**	**Frequency range**	**Distance**	
EN 55022 (AC supply, conducted)	66 ... 56 dB (µV)	150 kHz ... 500 kHz		
	56 dB (µV)	500 kHz ... 5 MHz		
	60 dB (µV)	5 MHz ... 30 MHz		
EN 55022 (DC supply/data, conducted)	40 ... 30 dB (µA)	150 kHz ... 500 kHz		
	30 dB (µA)	500 kHz ... 30 MHz		
EN 55022 (radiated)	30 dB (µV/m)	30 MHz ... 230 MHz	10 m	
	37 dB (µV/m)	230 MHz ... 1 GHz	10 m	

Mechanical strength acc. to IEC 61131-2		
Test specification	**Frequency range**	**Limit value**
IEC 60068-2-6 vibration	5 Hz ≤ f < 9 Hz	1.75 mm amplitude (permanent) 3.5 mm amplitude (short term)
	9 Hz ≤ f < 150 Hz	0.5 g (permanent) 1 g (short term)
	Note on vibration test: a) Frequency change: max. 1 octave/minute b) Vibration direction: 3 axes	
IEC 60068-2-27 shock		15 g
	Note on shock test: a) Type of shock: half sine b) Shock duration: 11 ms c) Shock direction: 3x in positive and 3x in negative direction for each of the three mutually perpendicular axes of the test specimen	
IEC 60068-2-32 free fall		1 m (module in original packing)

Electromagnetic compatibility				
Immunity to interference acc. to Germanischer Lloyd (2003)				
Test specification	**Test values**		**Strength class**	**Evaluation criteria**
IEC 61000-4-2 ESD	6 kV/8 kV (contact/air)		3/3	B
IEC 61000-4-3 electromagnetic fields	10 V/m 80 MHz ... 2 GHz		3	A
IEC 61000-4-4 burst	1 kV/2 kV (data/supply)		2/3	A
IEC 61000-4-5 surge	AC/DC Supply:	0.5 kV (line/line)	1	A
		1 kV (line/earth)	2	
IEC 61000-4-6 RF disturances	10 V/m 80 % AM (0.15 ... 80 MHz)		3	A
Type test AF disturbances (harmonic waves)	3 V, 2 W		-	A
Type test high voltage	755 V DC 1500 V AC		-	-

Emission of interference acc. to Germanischer Lloyd (2003)			
Test specification	**Limit values**	**Frequency range**	**Distance**
Type test (EMC1, conducted) allows for ship bridge control applications	96 ... 50 dB (µV)	10 kHz ... 150 kHz	
	60 ... 50 dB (µV)	150 kHz ... 350 kHz	
	50 dB (µV)	350 kHz ... 30 MHz	
Type test (EMC1, radiated) allows for ship bridge control applications	80 ... 52 dB (µV/m)	150 kHz ... 300 kHz	3 m
	52 ... 34 dB (µV/m)	300 kHz ... 30 MHz	3 m
	54 dB (µV/m)	30 MHz ... 2 GHz	3 m
außer für:	24 dB (µV/m)	156 MHz ... 165 MHz	3 m

Mechanical strength acc. to Germanischer Lloyd (2003)		
Test specification	**Frequency range**	**Limit value**
IEC 60068-2-6 vibration (category A – D)	2 Hz ≤ f < 25 Hz	± 1.6 mm amplitude (permanent)
	25 Hz ≤ f < 100 Hz	4 g (permanent)
	Note on vibration test: a) Frequency change: max. 1 octave/minute b) Vibration direction: 3 axes	