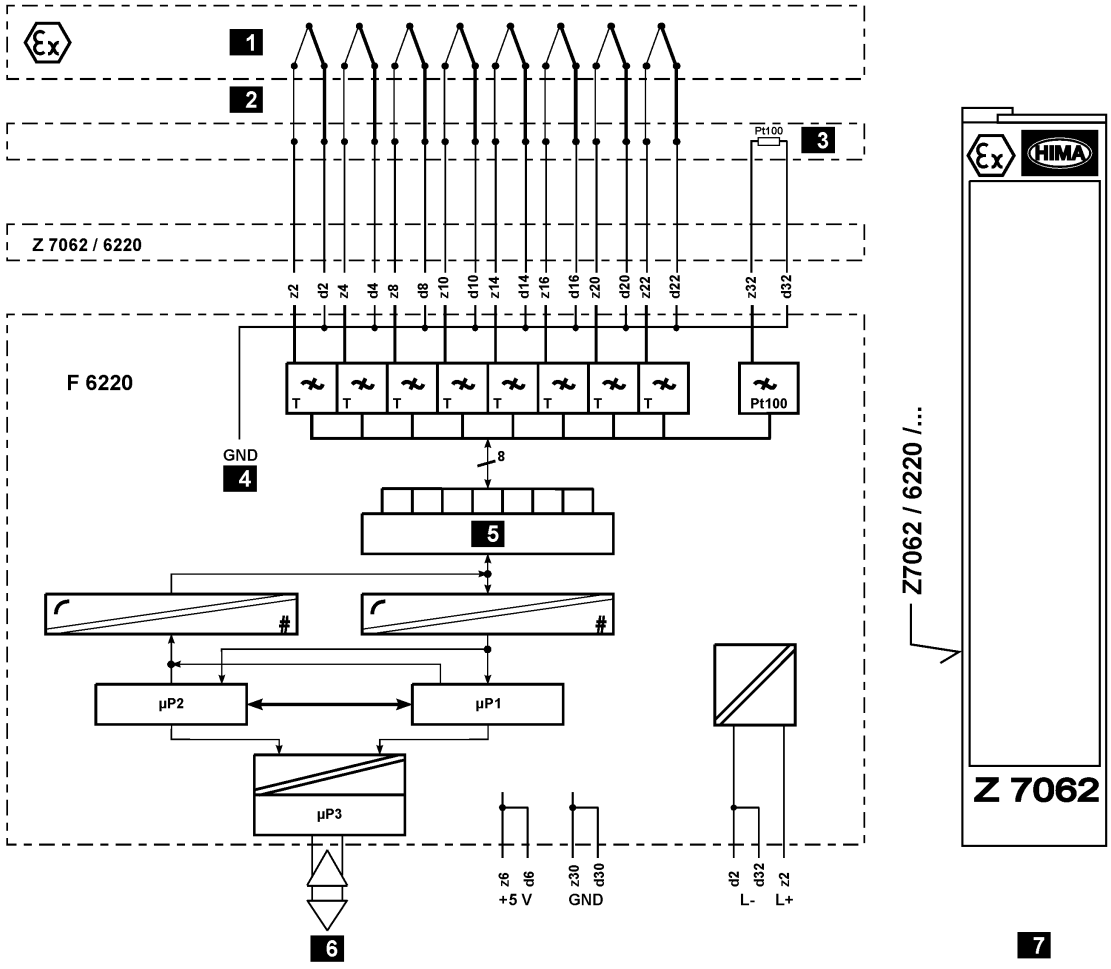
F 6220: TC Input Module (Ex)i

Safety-related, TÜV-tested in accordance with IEC 61508 for applications up to SIL 3

- 8 channels for connection to thermocouples.
- With Pt100 input for cold junction temperature measurement.
- Circuits with protective separation.
- EC Type Test Certificate: ATEX EX5 00 02 19183 031.
- For HIQuad X (SILworX) and HIQuad (ELOP II, **HF-TMP-3** function block required).



1 Measuring and connection point
2 Equalizing line
3 Cold junction
4 Analog GND
5 Multiplexer
6 I/O bus
7 Cable plug, front view

Figure 1: Module Block Diagram and Cable Plug Front View

HIMA Paul Hildebrandt GmbH, P.O. Box 1261, 68777 Brühl
English translation of the German original document: HI 803 068 D, F 6220, Rev.1.03 (2022)

Specifications

Inputs	Thermocouples R, S, B, J, K, T, E in accordance with DIN EN 60584-1 Temperature range between -270…+1820 °C or Voltage inputs -100…+100 mV Individual configuration via related function block For measurement circuits within [Ex ia] IIC 1 x Pt100 resistance thermometer, in accordance with DIN IEC 751 Input as cold junction temperature only
Measured value refresh	80 ms
Space requirement	4 HP
Current consumption	125 mA at 5 VDC (via backplane) 300 mA at 24 VDC (via backplane)

i

The module may only be operated with forced cooling, fans K 9203A or K 9212.

To ensure forced cooling, the M 7201 air deflector (1 RU) must be installed above the K 9203A fan or above the H 41q kit.

The M 7201 air deflector deflects the warm air backwards to avoid temperature increase of the racks and modules installed one above the other.

Wiring

Refer to Table 1 for the wire color coding of the following cable plugs:

- Cable plug Z 7062/6220/Cx/U100mV with gray cable, connect the cable shielding to the protective ground rail.
- Cable plug Z 7062/6220/Ex/Cx/U100mV with blue cable, shield connection (PA) on the field side.

Channel	Pin	Color	Connection
1	z2	WH	Cable: LiFYCY 12 x 0.2 mm² (shielded)
	d2	BN	
2	z4	GN	
	d4	YE	
3	z8	GY	
	d8	PK	
4	z10	BU	
	d10	RD	
5	z14	BK	
	d14	VT	
6	z16	GYPK	
	d16	RDBU	
7	z20	WHGN	
	d20	BNGN	
8	z22	WHYE	
	d22	BNYE	
Pt100	z32	WHGY	
	d32	BNGY	
Shield		YEGN	Female connector 6.3 x 0.8 mm² q = 2.5 mm², l = 60 mm Not applying to cable plugs Z 7062/6220/Ex…

Table 1: Wire Color Coding of the Cable Plug Z 7062/6220/...

General Configuration Notes

- If used with intrinsically safe circuits (Ex)i, adjacent F 6220 slots may be equipped with any type of module.
- Unused input channels must be short-circuited.
- For SIL 3, the cold junction temperature must be taken from the user program or derived by comparing the cold junction temperatures of two modules.
- For SIL 3, the thermocouple temperature must be determined by comparing the temperatures of two different thermocouples.

Notes for Configuration in ELOP II

- If a fault occurs, the VALUE input (INT) of the HF-TMP-3 function block issues the value 0 with no specification of underflow or overflow. The CHANNEL ERROR (BOOL) output must then be evaluated in the user program.
- To configure the module, use the operating system functions manual specific to the used operating system version. Pay particular attention to the section about noise blanking.
- Setting: safety time ≥ 3 x watchdog time.

1 Configuration in SILworX

The module is configured in the Hardware Editor of the SILworX programming tool.

To ensure safety-related use, the limit values preset in SILworX for short-circuits and open-circuits must be set in accordance with their use. The limit values must be configured individually for each channel.

A safety-related evaluation of the setting *Voltage Input* is only permissible within -100…+100 mV. A metrological accuracy exceeding this range cannot be ensured.

A safety-related evaluation of the setting *Thermocouple Type X* is only permissible within the monitored operating range specific to each thermocouple type. Refer to the F 6220 data sheet (HI 803 194 E) for details. A metrological accuracy exceeding the monitored operating ranges cannot be ensured. Additionally, the cold junction temperature range for Pt100 (-40 … +80 °C) must be maintained.

The *-> Process Value [REAL]* parameter automatically adopts the configured initial value if the limit values are violated or if an internal channel fault occurs. The users must adopt measures in the user program to ensure that this initial value causes the respective safety function to enter the safe state.

The *-> Raw Value [1 °C/1 mV = 10 000] [DINT]* parameter may only be used under the following conditions:

1. The measuring range for the voltage input or for the thermocouples is maintained. The cold junction temperature range for Pt100 (-40 … +80 °C) is maintained.
2. Additional evaluation of the *-> Process Value OK [BOOL]* parameter within the user program. FALSE must cause the respective safety function to enter the safe state.
3. Evaluation of the limit values for open-circuits and short circuits as *-> Process Value OK [BOOL]* automatically changes to FALSE when the set limit values are exceeded. Alternatively, the thresholds can also be evaluated in the user program.
4. Programming of a substitute value (initial value) in the user program, which causes the respective safety function to enter the safe state.

Additionally, observe the following points when configuring the module:

- To diagnose the module and channels, both the statuses and the measured value can be evaluated within the user program. For further details on the statuses and parameters, refer to the tables in Chapter 0 and following chapters.
- If a redundancy group is created, its configuration is defined in the tabs. The tabs specific to the redundancy group differ from those of the individual modules, see the following tables.
- If 2 inputs are redundantly configured, the larger of the two scaled values is written to the redundant system parameter *-> Process Value [REAL].* This applies provided that both modules are in proper working order. If faults occur, only the value of the fault-free module is processed. This requires an identical signal source for both inputs, e.g., a measured value. Any deviation between the two measured values must be within the safety-related accuracy.

To evaluate the system parameters in the user program, they must be assigned to global variables. Perform this step in the Hardware Editor using the module's detail view.

The following tables present the system parameters for the module in the same order as in the SILworX Hardware Editor.

1.1 The Module Tab

The **Module** tab contains the following system parameters:

System parameter	Data type	S [1]	R/W	Description
Name	---	---	W	Module name.
Noise Blanking	BOOL	Y	W	Allow noise blanking performed by the system (Activated/Deactivated). After a transient fault, the system delays the fault response until the safety time. The user program retains its last valid process value. Default setting: Activated (not changeable). Refer to the system manual (HI 803 211 E) for further details on noise blanking.
The following statuses and parameters can be assigned global variables and used in the user program.				
Explicitly Triggered Restart Required	BOOL	Y	R	TRUE: The module must be explicitly required to restart. FALSE: ▪ Restart is necessary and the module performs it automatically. ▪ Module in the STOP state. ▪ Connection loss.
Background Test Noise Blanking Active	BOOL	Y	R	TRUE: Error detected by a background test. FALSE: ▪ No errors detected by the background tests. ▪ Module in the STOP state. ▪ Connection loss.
Initialization Active	BOOL	Y	R	TRUE: The module is performing initial tests. FALSE: ▪ The initial tests are complete. ▪ Module in the STOP state. ▪ Connection loss.
Module OK	BOOL	Y	R	TRUE: No internal fault detected by the system. FALSE: ▪ Internal fault detected by the system. ▪ Module in the STOP state. ▪ Connection loss.
Module Process Value OK	BOOL	Y	R	TRUE: No channel fault detected by the system. FALSE: ▪ At least one channel fault detected by the system. ▪ Module in the STOP state. ▪ Connection loss.
Restart on Error Suppressed	BOOL	Y	W	Automatic restart after errors can be suppressed by the user. To cause the automatic restart to be performed after an error, the system parameter must have been set to FALSE for longer than the F-CPU safety time (does not apply to field faults). TRUE: No automatic restart after a module or channel fault. FALSE: Automatic restart after a module or channel fault. Default setting: FALSE
[1] The operating system handles the system parameter in a safety-related manner, yes (Y) or no (N).				

Table 2: The **Module** Tab in the Hardware Editor

1.2 The F 6220: Channels Tab

The **F 6220: Channels** tab contains the following system parameters for each channel:

System parameter	Data type	S [1)]	R/W	Description
Channel no.	---	---	R	Channel number, preset and cannot be changed.
Mode of operation		Y	W	The following options are available: ▪ Voltage ▪ Thermocouple Type R ▪ Thermocouple Type S ▪ Thermocouple Type B ▪ Thermocouple Type J ▪ Thermocouple Type T ▪ Thermocouple Type E ▪ Thermocouple Type K Default value: Voltage
Technical Unit		Y	W	If a thermocouple is set for *Mode of Operation*, the following physical units are available: ▪ °C ▪ °F ▪ K If voltage is set for *Mode of Operation*, *Technical Units* is preset to mV and cannot be changed.
-> Process Value [REAL]	REAL	Y	R	Raw value converted in accordance with the *Technical Unit* setting
-> Raw Value [1°C / 1mV = 10 000] [DINT]	DINT	N	R	Unhandled value measured for the channel. The safety-related use of the parameter in HIQuad X is only permitted under the specified conditions.
External Cold Junction Temperature [= Technical Unit] [REAL]->	REAL	Y	W	Value for the cold junction temperature in accordance with the setting in *Technical Unit*. Ranges of values: ▪ -50…90 °C ▪ -58…194 °F ▪ 223.15…363.15 K The cold junction temperature can only be specified if a thermocouple has been selected in *Mode of Operation*.
-> Process Value OK [BOOL]	BOOL	Y	R	TRUE: Fault-free channel. No internal fault nor fault on the field side detected. Module initialization successfully completed. FALSE: ▪ Faulty channel. Internal fault or fault on the field side detected. ▪ The initial test has not been completely performed. ▪ Module in the STOP state. ▪ Connection loss.

System parameter	Data type	S [1)]	R/W	Description
-> Channel OK [BOOL]	BOOL	Y	R	TRUE: Fault-free channel. FALSE: ▪ Faulty channel. ▪ Module in the STOP state. ▪ Connection loss. An external SC or OC has no influence on *-> Channel OK [BOOL]*. Observe the statuses *-> OC* [BOOL] and *-> SC [BOOL]*!
OC Limit [1°C / 1mV = 10000]	DINT	Y	W	Threshold in mA for detecting an open-circuit. If the process value falls under *OC Limit*, the module detects an open-circuit. Default value: -2 147 483 648
-> OC [BOOL]	BOOL	Y	R	TRUE: Open-circuit. FALSE: ▪ No open-circuit. ▪ Module in the STOP state. ▪ Connection loss.
SC Limit [1°C / 1mV = 10000]	DINT	Y	W	Threshold in mA for detecting a short-circuit. If the process value exceeds *SC Limit*, the module detects a short-circuit. Default value: 2 147 483 647
-> SC [BOOL]	BOOL	Y	R	TRUE: Short-circuit. FALSE: ▪ No short-circuit. ▪ Module in the STOP state. ▪ Connection loss.
Redund.	BOOL	Y	R	Requirement: A redundant module must exist. TRUE: The channel redundancy for this channel is active. FALSE: The channel redundancy for this channel is not active. Default value: FALSE
-> Channel Active [BOOL]	BOOL	Y	R	TRUE: ▪ The channel output parameters provide their values in accordance with the channel configuration. ▪ Module fault. ▪ Module in the STOP state. ▪ Connection loss. FALSE: The channel configuration has changed and the channel output parameters provide their values in accordance with the configuration that was previously valid.
[1)] The operating system handles the system parameter in a safety-related manner, yes (Y) or no (N).				

Table 3: Tab **F 6220: Channels** in the Hardware Editor

Global variables can be assigned to the system parameters with **->** and used in the user program. The values of the system parameters without **->** must be directly defined.

1.3 Description of Diagnostic Entry

The module is completely and automatically tested for safety-related errors during operation. The diagnostic entry is not 0 if one or more errors were detected in the module.

Defective modules must be replaced with a faultless module of the same type or with an approved replacement model.

Bit	Coding [1)]	Description
0	0x00000001	Hardware module fault.
1	0x00000002	The module in the slot was not deleted. The slot is either empty or equipped with incorrect module type.
2	0x00000004	Error when configuring the system safety times. Workaround: Set the valid values for the module by performing a download, a reload or an online change.
3	0x00000008	Module's component fault.
4	0x00000010	Module defective (the error code is for internal purposes only).
…	…	
31	0x80000000	
1) The status may consist of several codings, e.g.: Module status = 0x80000001 (0x00000001 + 0x80000000).		

Table 4: Diagnostic Entry Coding

1.3.1 Channel Status

The channel status byte in the diagnostic entry shows the following status:

Bit	Coding [1)]	Description
0	0x0001	Hardware channel fault. Workaround: Check the channel wiring. F-IOP indicator: Continuous light of the channel LED.
1	0x0002	Short-circuit (SC). Workaround: Check the channel wiring and the limit values. F-IOP indicator: Blinking1 of the channel LED.
2	0x0004	Open-circuit (OC). Workaround: Check the channel wiring and the limit values. F-IOP indicator: Blinking1 of the channel LED.
3	0x0008	Subsequent error because the channel uses the faulty Pt100 channel as the reference temperature for temperature measurement. Workaround: Check the error cause on the Pt100 channel and remove it. F-IOP indicator: Continuous light of the channel LED.
4	0x0010	Invalid data sink (most probable cause: data sink **cold junction temperature** is outside -50...90 °C). Workaround: Ensure that the values set for the data sink is valid. F-IOP indicator: Continuous light of the channel LED.
5	0x0020	Module defective (the error code is for internal purposes only).
…	…	
15	0x8000	
1) The status may consist of several codings, e.g.: Channel status = 0x8001 (0x0001 + 0x8000).		

Table 5: Channel Status of the F 6220

2 Applicable Thermocouples

Linearization in	< ±0.1 %
Nominal measuring range	
Resolution	0.1 °C
Type	R
Matching	Pt13%Rh/Pt
Nominal measuring range:	
Input voltage	-0.226…+21.003 mV
Temperature range	-50…+1760 °C
Monitored operating measuring range:	
Input voltage	-0.226…+21.003 mV
Temperature range	-50…+1760 °C
Value in ELOP II	-500…+17 600 (variable type INT)
Type	S
Matching	Pt10%Rh/Pt
Nominal measuring range:	
Input voltage	-0.236 mV…18.609 mV
Temperature range	-50 °C…1760 °C
Monitored operating measuring range:	
Input voltage	-0.236 mV…18.609 mV
Temperature range	-50 °C…1760 °C
Value in ELOP II	-500…+17 600 (variable type INT)
Type	B
Matching	Pt30%Rh/Pt6%Rh
Nominal measuring range:	
Input voltage	0.092…13.820 mV
Temperature range	150…1820 °C
Monitored operating measuring range:	
Input voltage	0.002…13.820 mV
Temperature range	50…1820 °C
Value in ELOP II	+500…+18 200 (variable type INT)
Type	Y
Matching	Fe/CuNi
Nominal measuring range:	
Input voltage	-8.095…69.553 mV
Temperature range	-210…+1200 °C
Monitored operating measuring range:	
Input voltage	-8.095…+69.553 mV
Temperature range	-210…+1200 °C
Value in ELOP II	-2100…+12 000 (variable type INT)

Type	K
Matching	CrNi/NiAl
Nominal measuring range:	
Input voltage	-6.035…+54.819 mV
Temperature range	-210…+1370 °C
Monitored operating measuring range:	
Input voltage	-6.458…+54.819 mV
Temperature range	-270…+1370 °C
Value in ELOP II	-2700…+13 700 (variable type INT)

Type	T
Matching	Cu/CuNi
Nominal measuring range:	
Input voltage	-5.753…1.003 mV
Temperature range	-210…+400 °C
Monitored operating measuring range:	
Input voltage	-6.258…+21.003 mV
Temperature range	-270…+400 °C
Value in ELOP II	-2700…+4000 (variable type INT)

Type	E
Matching	CrNi/CuNi
Nominal measuring range:	
Input voltage	-9.063…+76.373 mV
Temperature range	-210…+1000 °C
Monitored operating measuring range:	
Input voltage	-9.835…+76.373 mV
Temperature range	-270…+1000 °C
Value in ELOP II	-2700…+10 000 (variable type INT)

3 Specifications

3.1 Low Voltage Input

Input voltage	-100…+100 mV
Linearization	< ±0.1 %
Resolution	0.01 mV (with scaling 0.1 %)
Value in ELOP II	-10 000…+10 000 (variable type INT)

3.2 Cold junction temperature input

Cold junction temperature input	Pt100 as two-wire measurement (maximum line length 6 m)
Cold junction temperature range	-40…+80 °C
Resolution	0.1 °C
Value in ELOP II	-400…+800 (variable type INT)

The Pt100 input of the F 6220 module can be used as cold junction temperature for all the channels. Alternatively, a cold junction temperature can be defined for each individual channel.

3.3 Additional Data

Input resistance	> 1 MΩ
Cable length	Approx. 300 m, double shielded cable, twisted pair, maximum resistance 500 Ω for measurement circuits
Interference voltage suppression	≥ 60 dB (common mode 50/60 Hz)
Withstand voltage	< 375 V (ex circuit -> non-ex circuit)
	7 V (ex circuit -> ex circuit)

The value in ELOP II can be scaled to 0...1000 using the HF-TMP-3 function block. Here it is possible to select only one window of the measurement range.

3.4 Errors

Intrinsic error (from nominal value)	< 0.1 % at 25 °C
Metrological single error:	
Channel fault	±0.1 %
Temperature error zero point	±0.1 % / 10 K
Temperature error endpoint	±0.1 % / 10 K
Linearity error	±0.05 %

4 Operating Instructions for F 6220

4.1 Use

The module is suitable for measuring temperatures with low-resistance thermocouples. A Pt100 is used as cold junction temperature. The thermocouples may be installed in areas with explosive atmosphere up to zone 0.

Digitized process signals are available in the HIMA PES.

⚠ WARNING

The inputs must not be supplied with external voltage.

The module may no longer be used in (Ex)i applications as associated equipment if it has been previously operated in a general electrical plant.

Only the applications described in the F 6220 data sheet are allowed.

4.2 Electrical Data Concerning Intrinsic Safety

For these specifications, refer to the Annex to the EC type test certificate EX5 00 02 19183 031.

4.3 Mounting

The module is mounted in a 19-inch rack. A mounting distance is not mandatory. The rack must be designed to allow dissipation of the generated power.

The module is connected to the intrinsically safe field circuits through cable plug Z 7062.

For further installation instructions, refer to the HIQuad X system manual (HI 803 211 E) or the HIQuad catalog (HI 800 263 E).

4.4 Installation

- The electronic module as associated equipment, including its connected components, must be installed to ensure achievement of degree of protection IP20 or higher in accordance with EN 60529/IEC 60529.
- The specified environment temperature range for explosion protection is:
  T = -25…+60 °C.
- Either two intrinsically safe input circuits within a module may be connected in parallel, or an intrinsically safe input circuit within an F 6220 to an intrinsically safe input circuit within another F 6220. The reduced maximum values (C0, L0) resulting from this wiring must be taken into account (see the EC type examination certificate).
- A distance of ≥ 50 mm (arcing distance) must be ensured between external, intrinsically safe and non-intrinsically safe terminals.
- A distance of ≥ 6 mm (arcing distance) must be ensured between the external terminals of adjacent, intrinsically safe circuits.
- Intrinsically safe and non-intrinsically safe lines must be separated, or the intrinsically safe lines must be additionally insulated.
- Intrinsically safe lines must be marked, e.g., using a light blue color (RAL 5015) for the sheath.
- The wiring must be mechanically protected to guarantee that the minimum distance between intrinsically safe and non-intrinsically safe connection (EN 60079-11/IEC 60079-11) is not violated due to accidental disconnection.
- The cable shield must be connected to the equipotential bonding. In non-intrinsically safe applications, the shield must be connected to the protective ground rail of the rack.

The wires in use must comply with the following insulation test voltages:

Intrinsically safe wires	≥ 1000 VAC
Intrinsically safe shielded wires	≥ 500 VAC
Non-intrinsically safe wires	≥ 1500 VAC

If finely stranded wires are used, the wire ends must be provided with wire end ferrules. The terminals must be suitable for fastening the cross-sections of the cables in use.

Additionally, the applicable regulations and standards must be observed. In particular, these include:

- EN 60079-14:2014 / IEC 60079-14:2013
- EN 60079-0:2012 + A11:2013 / IEC 60079-0:2011, Revised + Cor.:2012 + Cor.:2013
- EN 60079-11:2012 / IEC 60079-11:2011 + Cor.:2012

4.5 Start-Up

Proper installation, in particular the connections of the supply voltage and intrinsically safe circuits, must be checked by an explosion protection expert prior to starting up the module for the first time.

4.6 Operation in ELOP II

The error codes for the modules appear on the display of the corresponding central unit. For further information, refer to the HIQuad operating system manual (HI 800 105 E).

4.7 Maintenance

If failures occur, the defective module must be replaced with a module of the same type or with an approved replacement model.

i Only the manufacturer may repair the module.

ZERTIFIKAT ◆ CERTIFICATE ◆ 認証書 ◆ CERTIFICADO ◆ CERTIFICAT

EC Type Examination Certificate

No.: EX5 00 02 19183 031

TÜV PRODUCT SERVICE

in accordance with Annex III of Council Directive No. 94/9/EC for equipment and protective systems intended for use in potentially explosive atmospheres (ATEX) for

HIMA Paul Hildebrandt GmbH + Co KG
Albert-Bassermann-Straße 28

68782 Brühl

Product:	**Automation devices, safety-related type F**
Model:	**F 6220**
Parameters:	see appendix (four pages)

The above mentioned product meets the provisions of the Directive.

This certificate is issued on the basis of the product provided for testing and certification and on its technical documentation. The detailed results of the test and the provided technical documentation are listed in

Test report no.: 990187410

This certificate pertains only to the sample product submitted to TÜV PRODUCT SERVICE for testing. Therefore this certificate has no specified period of validity.

Released with the above mentioned certificate number by the Certification Body of TÜV PRODUCT SERVICE.

Department: PS-IQSE / jb
Date: 17.03.2000

TÜV PRODUCT SERVICE

TÜV PRODUCT SERVICE GMBH is a Notified Body in accordance with Council Directive 94/9/EC for equipment and protective systems intended for use in potentially explosive atmospheres with the identification number 0123.

TÜV PRODUCT SERVICE GMBH · Zertifizierstelle · Ridlerstrasse 65 · D-80339 München

Appendix to EC Type Examination Certificate
No.: EX5 00 02 19183 031

TÜV PRODUCT SERVICE

1 Description

The module F6220 is a associated apparatus for installation only outside an atmosphere capable of explosion. This subassembly unit for installation in a subrack consist of two PCB-boards. Nine galvanically coupled intrinsically safe input ports are connectable at the front and the output- and the power supply port are connectable at the rear of this module.

2 Electrical data

2.1 Intrinsically safe port, X2

The channel 1..8 for thermocouple and channel 9 for platinumsensor (PT 100) are intrinsically safe and safety isolated up to a peak value of 375V to the other terminals.

Input, Pin	Function	Common Reference, Pin
Z2	Thermocouple [1]	D2
Z4	Thermocouple [2]	D4
Z6	not connected	D6
Z8	Thermocouple [3]	D8
Z10	Thermocouple [4]	D10
Z12	not connected	D12
Z14	Thermocouple [5]	D14
Z16	Thermocouple [6]	D16
Z18	not connected	D18
Z20	Thermocouple [7]	D20
Z22	Thermocouple [8]	D22
Z24	not connected	D24
Z26	not connected	D26
Z28	not connected	D28
Z30	not connected	D30
Z32	Platinumsensor [PT 100]	D32

Appendix to EC Type Examination Certificate
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TÜV PRODUCT SERVICE

2.1.1 Input port for thermocouple, channel 1...8

Voltage, U_0	crest value DC 19 V
Current, I_0	crest value DC 6 mA
Power, P_o	crest value 28,5 mW
internal capacitor, C_i	negligible
internal inductance, L_i	negligible

The permissible ratings for max. capacitor and inductance for one and two parallel input ports are listed in the following tables.

2.1.1.1 EEx ia IIC

max. connectable inductance of one and several input port	L_0 = 2 mH
max. connectable capacitor of one input port	C_0 = 0,2 µF
max. connectable capacitor of two parallel input port	C_0 = 0,2 µF

2.1.1.2 EEx ia IIB

max. connectable inductance of one and several input port	L_0 = 2 mH
max. connectable capacitor of one input port	C_0 = 1,1 µF
max. connectable capacitor of two parallel input port	C_0 = 1,1µF

2.1.1.3 EEx ib IIC

max. connectable capacitor of one and several input port	C_0 (L_0 = 0) = 0,25 µF
max. connectable inductance of one input port	L_0 (C_0 = 0) = 0,6 H
max. connectable inductance of two parallel input port	L_0 (C_0 = 0) = 0,58 H

2.1.1.4 EEx ib IIB

max. connectable capacitor of one and several input port	C_0 (L_0 = 0) = 1,5 µF
max. connectable inductance of one input port	L_0 (C_0 = 0) = 1 H
max. connectable inductance of two parallel input port	L_0 (C_0 = 0) = 1 H

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TÜV PRODUCT SERVICE

2.1.2 Input port for platinumsensor (PT 100)

Voltage, U_0	crest value DC 19 V
Current, I_0	crest value DC 11 mA
Power, P_o	crest value 52,3 mW
internal capacitor, C_i	negligible
internal inductance, L_i	negligible

2.1.2.1 EEx ia IIC

max. connectable inductance	L_0 = 2 mH
max. connectable capacitor	C_0 = 0,2 µF

2.1.2.2 EEx ia IIB

max. connectable inductance	L_0 = 2 mH
max. connectable capacitor	C_0 = 1,1 µF

2.1.2.3 EEx ib IIC

max. connectable capacitor	C_0 (L_0 = 0) = 0,25 µF
max. connectable inductance	L_0 (C_0 = 0) = 0,3 H

2.1.2.4 EEx ib IIB

max. connectable capacitor	C_0 (L_0 = 0) = 1,5 µF
max. connectable inductance	L_0 (C_0 = 0) = 1 H

2.2 Output port, X1 pin Z8, Z22...Z28 / D8, D20...D28 (non-intrinsically safe)

Voltage: crest value 5 V

2.3 Power supply port, X1 pin Z2 / D2 (non-intrinsically safe)

Nominal voltage	DC 24 V
Voltage	crest value DC 30 V
Power	6 W
Absolute maximum voltage to not affect the intrinsic safety	U_m crest value 40V

Appendix to EC Type Examination Certificate
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TÜV PRODUCT SERVICE

3 Identifying marking

The legible and durable marking must include the following option list:

- Name and address of the manufacturer,
- CE-marking (Annex X, point A directive 94/9/EC),
- designation of series or type / serial number,
- year of construction,
- the identifier Ⓔx II (1)G [EEx ia] IIC
- essential information for safe use

4 Intended use in potentially explosive atmospheres

Pay attention to intended use in potentially explosive atmospheres by detailed instructions for safe use by the manufacturer according Annex II directive 94/9/EC.

5 Production quality assurance

The manufacturer shall operate an approved quality system for production, final equipment inspection and testing according Annex X directive 94/9/EC.

Munich, March 17th 2000

TÜV PRODUCT SERVICE GmbH PS-IQSE

Notified Body

Dipl.-Ing. J. Blum

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