



**北京康吉森技术有限公司**  
Beijing Consen Technologies Co.,Ltd.

No.7 Anxiang Street, Area B, Tianzhu Airport Economic  
Development Zone, Shunyi District, Beijing, China, P.C.:101318

Tel : +86-010-8046-9999

Fax : +86-010-8046-9666 / 8046-9711

# TSxPlus

Safety and Critical Control Expert



北京康吉森技术有限公司  
Beijing Consen Technologies Co., Ltd.

中國自動化

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Petroleum and petrochemical

**Beijing Consen Technologies Company Limited** is a subsidiary of China Automation Group Limited, we are committed to developing high reliability safety and critical process plant control products for process industry that help you control and protect your critical equipment since its establishment in 1999.

The company was awarded the title of "**Beijing Engineering Laboratory** (key control technologies of safety production in petrochemical industry)" in 2017.

More than 80% of our employees, are R & D engineers, more than 90% are masters or Ph.D. Most of our R & D team members have at least 10 years of R & D experience of industrial automation control system products (SIS, DCS, PLC, etc.). Here are some major milestones along the way:

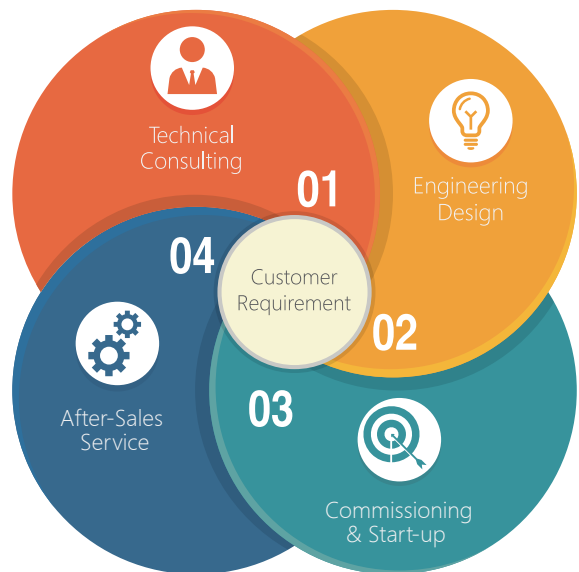
- TurboSafe Turbine Overspeed Trip Protection
  - DSC100 Digital Servo Controller
  - LVDT Signal Conditioner Connections
  - SIM300 Machine Status Signals Integrated Simulator
- SPD325 Speed Calibrator
  - T121 Industrial Speed Counter
  - **TSxPlus Safety and Critical Control System**

The TSxPlus controller that is fault tolerance by means of Triple-Modelar Redundant(TMR) architecture. TMR integrates three isolated, parallel control system, include Main Processor, I/O and Communication modules.

In addition to SIL3 Functional Safety Certification of Germen TÜV Rheinland system, it also has the both information safety certification of Germen TÜV Rheinland and ISASecure EDSA, in compliance with the standards of the latest IEC62443 and ISASecure EDSA standards.



## Life cycle service concept with uniform standard



# SYSTEM OVERVIEW



## TSxPlus System

The TSxPlus controller can be used in safety and critical process plants applications that require a significant degree of safety and availability.

The TSxPlus is a logic and process control system that provides a high level of system fault tolerance. To ensure the highest possible system integrity at all times, the system includes these features:

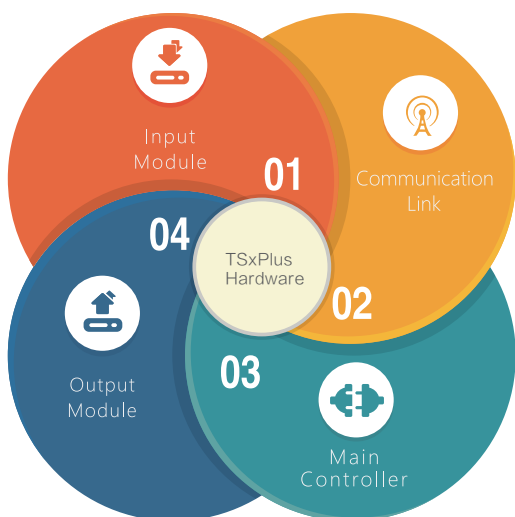
- Triple Modular Redundant (TMR) architecture.
- Degradation mode of 3-2-1-0.
- Withstands harsh industrial environments.
- Online Maintenance, Replacing an I/O module does not disturb field wiring.
- SIL3/SL1

## Product Composition

TSxPlus System provides Hardware and Software.

The TSxPlus controller that is Fault-Tolerance by means of Triple-Modular Redundant (TMR) architecture includes: Input Modules, Communication, Main Processor and Output Modules.

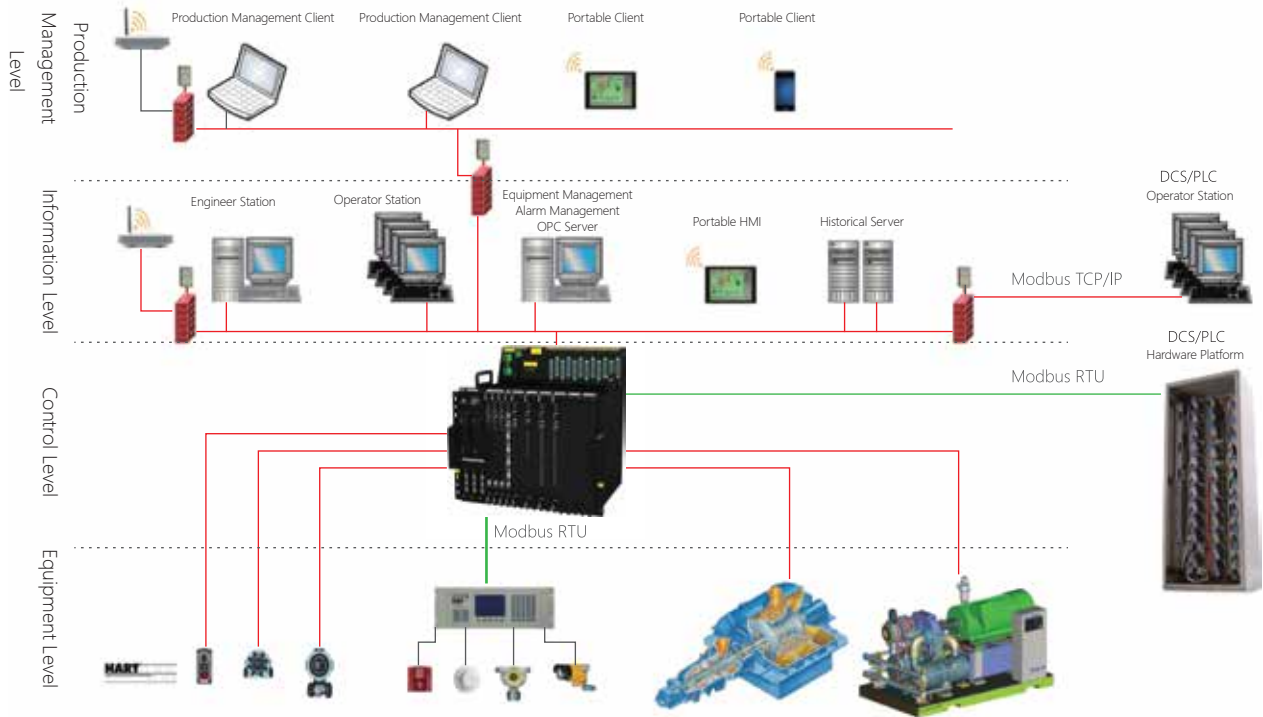
The Software platform includes: Architect, Architect Monitor, Architect Event, OPC Server, Architect DTMLibrary and Architect Viewer.



Hardware Platform

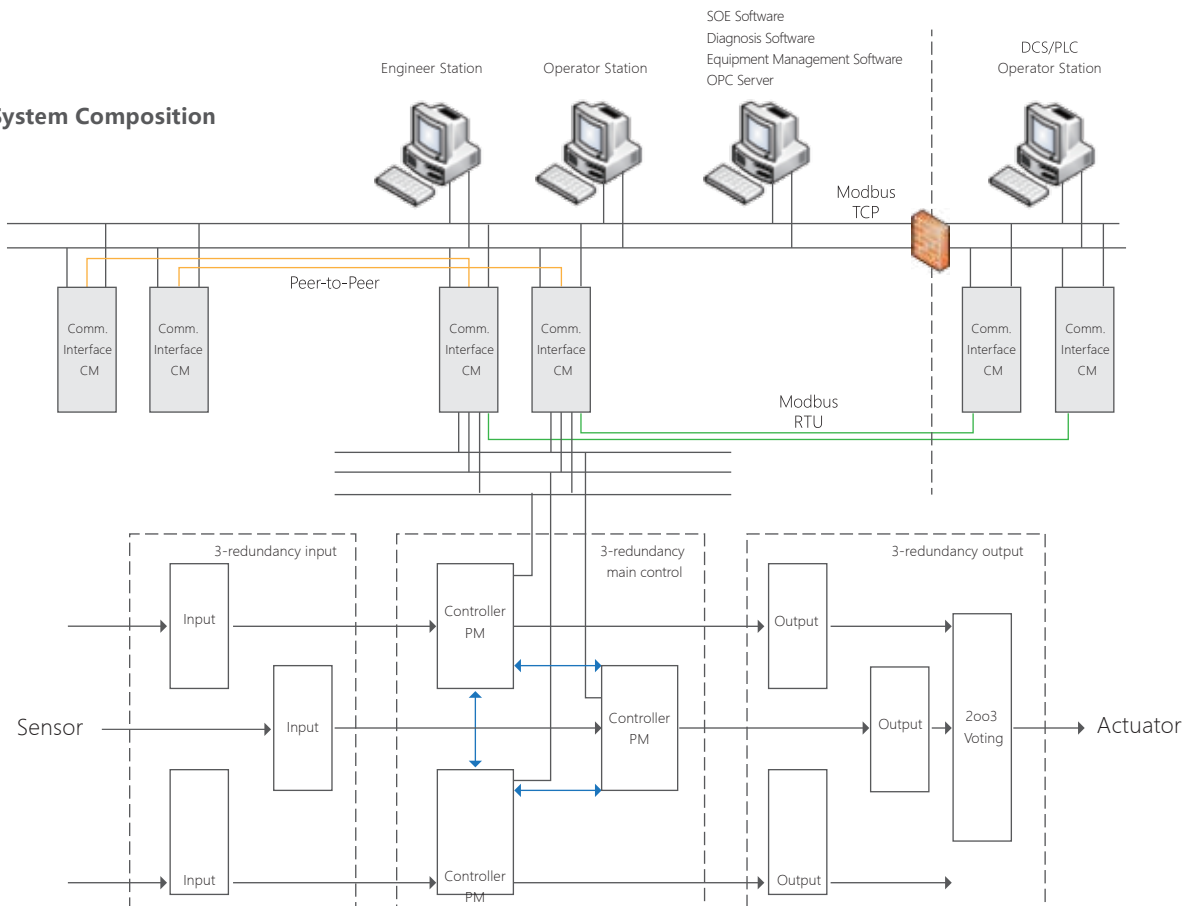


Software Platform



**Solution Overview**

**System Composition**



# SYSTEM FEATURES



## Security & Availability

1  
PART ONE

The Safety instrumented system (SIS) in process automation pays close attention to the system availability is not less than functional safety. The TSxPlus system can lower the probability of shutdown by system failure and maintain the safety grade of safety circuit after system degradation.

## Integrated Solution for Safety and Critical Control

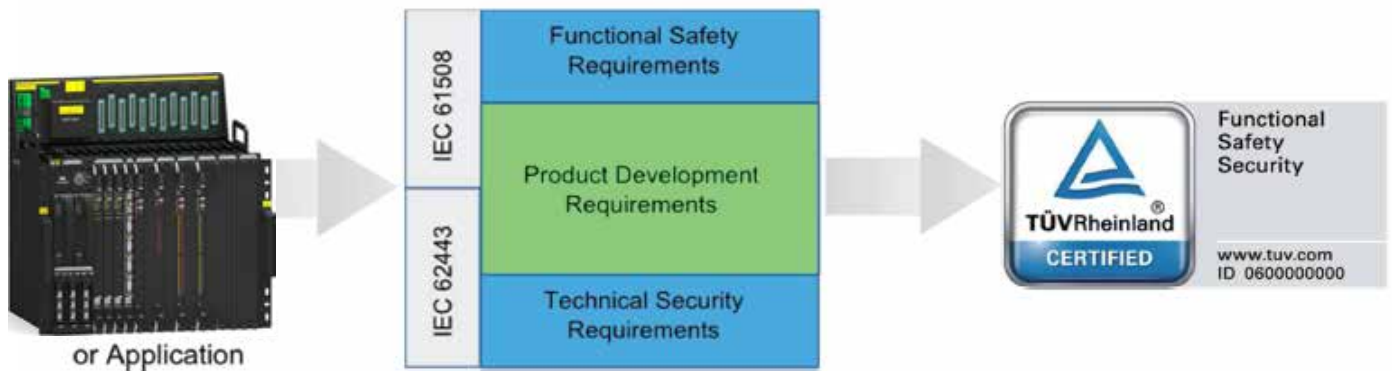
2  
PART TWO

The TSxPlus system Integrated solution for safety protection and critical process plants control, especial ESD and Turbomachinery controls can be running in one TSxPlus controller that make you to reduce the cost of investment and easy to maintain.

## Functional Security & Information Security

3  
PART THREE

In addition to SIL3 Functional Safety Certification of German TÜV Rheinland, the TSxPlus system also is the first and only one domestic system that has the both information safety certification of German TÜV Rheinland and ISASecure ESDA, in compliance with the standards of the latest IEC62443 and ESDA standards. It can further help users to set deep defense system and reduce risks.



Information Security and Functional Security Co-certification

## Faster Response Time

4  
PART FOUR

Responsive time is one of the key feature of safety functions. The TSxPlus controller loop response time can be lower to 15ms, and the controller task execution cycle time can be lower to 5ms.

## Two Tasks In One Controller

5  
PART FIVE

The faster and slower tasks can be configured freely in one TSxPlus controller. The execution cycle time of faster task can be set lower to 5ms. By integrating faster task and slower task into one TSxPlus controller that is possible to reduce effectively investment and maintenance cost.

## Independent Overspeed Protection Function

6  
PART SIX

The TSxPlus system Overspeed module (OSP) satisfy the requirement of API670 standards, the industrial process control function and protection function are physically independent from each other to avoid any simultaneous failure.

## Ease Using of HART

7  
PART SEVEN

The Analog I/O modules can be connected directly with HART intelligent instrument. The Analog I/O modules internally support HART protocol analysis. By transmitting HART command through the communication link of I/O cards with Main Process, HART signal allocation and protocol conversion are physically integrated with the TSxPlus system.

## Flexible Chassis Extension

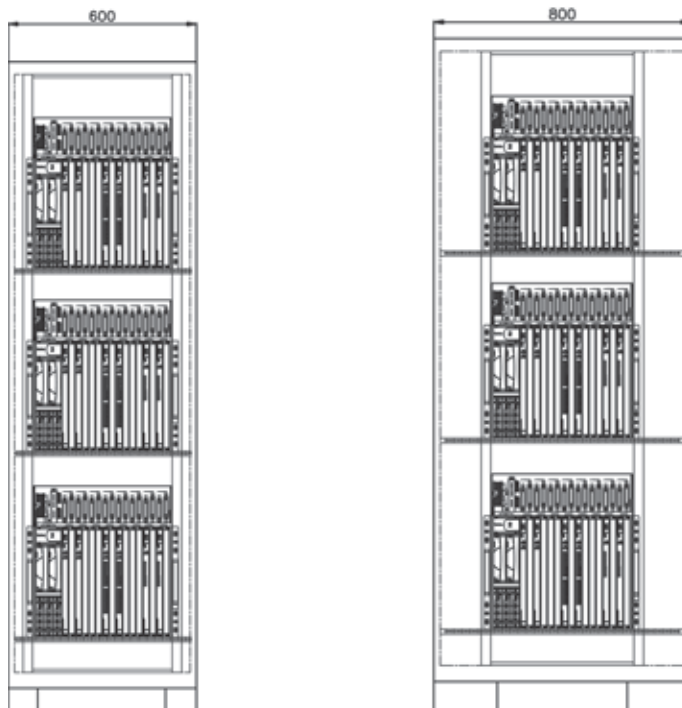
8  
PART EIGHT

Each Main Chassis and Expansion Chassis has 3 Bus Interface (BI) modules that connect across IP\_BUS, IP\_BUS is interconnected by Optical-Fiber. Each BI module has 3 SFP Optical-module interface, support star connection and bus connection for the TSxPlus Chassis.

## Save Assemble Space

9  
PART NINE

The TSxPlus Chassis is design 482mm in wide by 483mm in high by 411mm in deep, so it can be assembled in the standard panel of 600mm or 800mm in wide that saved the panel room space for customer.



Panel Layout



# HARDWARE



## TSxPlus Hardware

The TSxPlus hardware is of the complete triple redundant architecture, including input module, main processor module and output module. The combination of triple redundant architecture, high-quality self-diagnosis, 3-2-1-0 degraded mode, single independent physical card, simple and easy-to-use and other aspects brings the integration of high safety, high availability and high maintainability.

The inner module of the chassis is mounted on the guide rail, the front panel's plug of the module can be easily used to replace the module from the chassis, and the front screw of the module use to ensure the module avoid vibration and shock.

The internal circuit board of all hardware components is applied to the coating process, and certified with 3G anti-corrosion standard.

A TSxPlus system station is composed of a Main Chassis and up to 14 Expansion Chassis. The maximum system size is a total of 118 I/O modules, 3776 channels can be support at most.

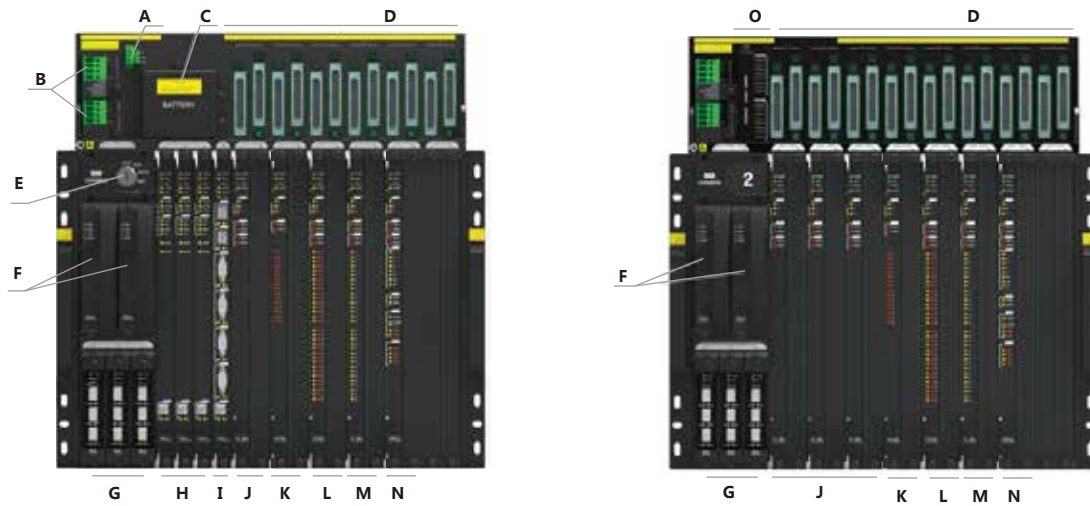
### TSxPlus System Hardware Lists

No.	Type	Description
1	MC01	Main Chassis
2	EC01	Expansion Chassis
3	PW01	Chassis Power Supply Module
4	PM01	Main Processor
5	CM01	Communication Module
6	BI01	Bus Interface Module
7	AI3281	Analog Input Module
8	AO1681	Analog Output Module
9	DI3201	Digital Input Module
10	DO3201	Digital Output Module
11	OSP01	Overspeed Protection Module
12	T-AI1601	Analog Input FTA
13	T-AO1601	Analog Output FTA
14	T-DI1601	Digital Input FTA
15	T-DO1601	Digital Output FTA
16	T-OSP01	Overspeed Protection FTA-01
17	T-OPS02	Overspeed Protection FTA-02



Hardware Platform

## Main Chassis and Expansion Chassis



A. PPS input terminal	B. Power terminals	C. Memory backup battery	D. Connectors for FTAs
E. Keyswitch	F. Redundant PWs	G. Three BIs	H. Three PMs
I. CM	J. AI with hot-spare	K. AO with hot-spare	L. DO with hot-spare
M. DI with hot-spare	N. OSP with hot-spare	O. Chassis address jumper setting	

### Chassis Specification

Main Chassis (MC01)	Size (L*H*D)	482mm*483mm*411mm
	Weight	19.4kg
	Specification	Redundant PWs Main Processor(TMR) Bus Interface(TMR) Up to four CMs Up to Six I/O Input Modules
Expansion Chassis (EC01)	Size (L*H*D)	482mm*483mm*411mm
	Weight	17.8kg
	Specification	Redundant PWs Bus Interface(TMR) Up to Eight I/O Input Modules

# HARDWARE



## Main Processor Module

The TSxPlus controller include three PMs. Each PM controls a separate channel of the system and operates in parallel with the other PMs.

As the Master station of IP\_BUS protocol, PM gets field data from AI, DI and PI, after processing and 2oo3 voting, sends the field output data to DO or AO.

### Main Parameters

Input Voltage	24VDC
Hot Swap	Support
Redundant Power Supply	Yes
CPU	Industrial High Reliability Dual Core CPU
Memory	64MBytes , 32-bit CRC
Power-Off Retain	Support, Memory backup battery
Running Modes	RUN、STOP、PROG、INIT 4 codes identified by keyswitch
Size(H*D*W)	352mm*355mm*19mm
Weight	1.55kg



# Communication Module

CM01 is responsible for the communication between Control Station and PC software, communication between Control Stations, and communication between Control Station and third party system. CM01 is also used to implement synchronization function.

CM01 communicates with the third party system via Modbus protocol. One option is via Modbus TCP protocol, which is running in Ethernet (System Net), while the other option is via Modbus RTU/ASCII protocol, which is RS485/422 communication.

## Main Parameters

Input voltage	24VDC
Hot swap	Support
Redundant Power Supply	Yes
CPU	Industrial high reliability dual core CPU
FLASH Capacity	64MBytes , 32-bit CRC
Port RJ45	2 x Ethernet Port NTP/SNTP Timing Synchronization 10/100/1000BASE-T(X)self-adaption, automatic MDI/MDIX Modbus-TCP protocol Master and slave configurable
Port Modbus	4 x Serial Port Modbus-RTU /ASCII protocol Master or Slave Mode 2×RS485 , 2×RS485/RS422 Port4 GPS Timing Synchronization
Size(H*D*W)	352mm*355mm*19mm
Weight	1.55kg



# HARDWARE



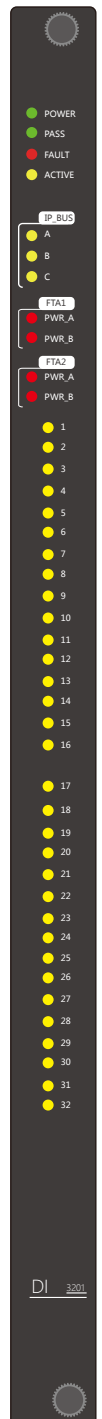
## Digital Input Module

DI3201 supports 32-point 24VDC Type 1 signal inputs and only supports NC (Normally Closed) signal for safety applications.

DI3201 uses TMR architecture, and the redundant three channels are designed on the same module. DI3201 is connected to PM and FTA via connectors fixed on the backplane. Each DI3201 has two FTAs, where there are 16 points in each FTA. When DI is configured in dual redundant, two redundant modules share the FTA.

### Main Parameters

System Power Supply	24VDC
Field Power Supply	24VDC
Hot Swap	Support
Redundant Power Supply	Yes
CPU	Industrial high reliability dual core CPU
Channel	32
Input Signal	Type 1
Filtering	Filtering time: 0~100ms configurable, step is 1ms. default filtering time is 10ms
Allowed Cable Resistor In Input Circuit	≤50Ω
SOE	SOE resolution 1ms
Safe State	For functional safety application, "ON" is normal state, "OFF" is demand state.
Size(H*D*W)	352mm*355mm*19mm
Weight	1.65kg



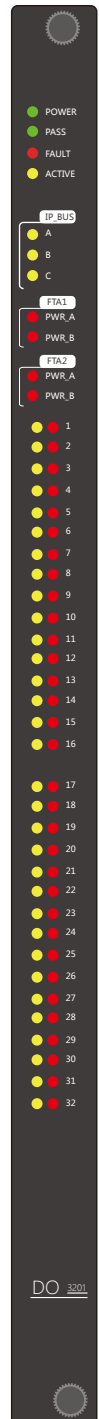
# Digital Output Module

DO3201 module is connected to PM and FTA via connectors fixed on the backplane. Each DO3201 module has two FTAs, where there are 16 points in each FTA. When DO3201 module is configured in dual redundant, two redundant modules share the FTA.

DO3201 Model has extensive diagnostics on each channel, module, and functional circuit immediately detect and report operational faults by means of indicators or alarms.

## Main Parameters

System Power Supply	24VDC
Field Power Supply	24VDC
Hot Swap	Support
Redundant Power Supply	Yes
CPU	Industrial high reliability dual core CPU
Channel	32
Load Type	DC-13 , IEC60947-5-1
Rated Output Voltage	24VDC
Output Type	Up to 1.7A output per channel
Over Current Protection	Support
Diagnostic	Loop open, over-load etc.
Size(H*D*W)	352mm*355mm*19mm
Weight	1.65kg



# HARDWARE



## Analog Input Module

AI3281 module supports 32-point two-wire and four-wire 4~20mA AI signal inputs, and the module uses TMR architecture, the redundant three channels are designed on the same module.

AI3281 is connected to PM01 and FTA via connectors fixed on the backplane. Each AI3281 has two FTAs, where there are 16 points in each FTA. When AI3281 is configured in dual redundant, two redundant modules share the FTA.

AI3281 Model has extensive diagnostics on each channel, module, and functional circuit immediately detect and report operational faults by means of indicators or alarms.

AI3281 module supports HART communication with the instruments which has HART function.

### Main Parameters

System Power Supply	24VDC
Field Power Supply	24VDC
Hot Swap	Support
Redundant Power Supply	Yes
CPU	Industrial high reliability dual core CPU
Channel	32
Input Signal Measure Range	4-20mA
Accuracy	≤ 0.15% F.S. ( -10 °C~60°C )
Allowed Cable Resistance In Input Circuit	≤50Ω
SOE	SOE Scan time 2ms User configuration, each point support at most 4 point threshold.
Diagnostic	Loop Open, Short Circuit etc.
Size(H*D*W)	352mm*355mm*19mm
Weight	1.75kg



# Analog Output Module

AO1681 supports 16-point 4~20mA current signal output. AO1681 uses TMR architecture, and the redundant three channels are designed on the same module.

AO1681 is connected to PM01 and FTA via connectors fixed on the backplane. Each AO1681 has one FTA, where there are 16 points in the FTA. When AO1681 is configured in dual redundant, two redundant modules share the FTA.

AO1681 Model has extensive diagnostics on each channel, module, and functional circuit immediately detect and report operational faults by means of indicators or alarms.

AO1681 supports HART communication with the instruments which has HART function.

## Main Parameters

System Power Supply	24VDC
Field Power Supply	24VDC
Hot Swap	Support
Redundant Power Supply	Yes
CPU	Industrial high reliability dual core CPU
Channel	16
Input Signal Measure Range	4-20mA
Accuracy	≤ 0.25% F.S. ( -10 °C~60°C )
Safe Status	Defend safe output 0mA
Load	Max.750Ω@24VDC
Diagnostic	Loop Open, Over-Load etc.
Size(H*D*W)	352mm*355mm*19mm
Weight	1.65kg



AO 1681E



# HARDWARE



## Overspeed Protection Module

OSP01 module has two functions one is as PI, and other is as Overspeed Protection. The module uses TMR architecture, and the redundant parts are designed on the same module.

OSP01 is connected to PM01 and FTA via connectors fixed on the backplane. Each OSP01 has two FTAs, where one FTA is used for PI signals and the other is used for DO and DI signals. When OSP01 is configured in dual redundant, two redundant modules share the FTA.

OSP01 Model has extensive diagnostics on each channel, module, and functional circuit immediately detect and report operational faults by means of indicators or alarms.

### Main Parameters

System Power Supply	24VDC
Field Power Supply	24VDC
Hot Swap	Support
Redundant Power Supply	Yes
CPU	Industrial high reliability dual core CPU
Channel	8PI , 4DO , 2DI
Probe Type	Passive magnetic pick-ups /active proximity probe /eddy current probe
Passive Magnetic Pick-ups	Measurement frequency range/Sample voltage range
Active Proximity Probe/ Eddy Current Probe	Measurement frequency range/Input amplitude
Input Impedance	>2kΩ
Speed Measurement Accuracy	±1Hz@ <10KHZ
Support Direction Detection	Support
PI Channel Protection	Over voltage(36V) protection
DO Load Type	DC-13,IEC60947-5-1
DO Channel Load	Max. output 1.7A
DO Load Protection	The point will self-protect in case of over-current
DI Channel Type	Type1 (IEC 61131-2)
Osp Response Time	<12ms@1KHz
OSP Standard	API670
Size(H*D*W)	352mm*355mm*19mm
Weight	1.7kg



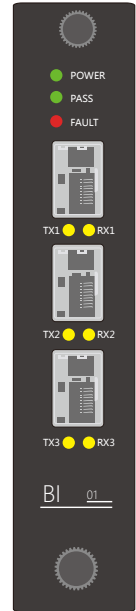
AI 3281

# Bus Interface Module

BI01 is repeater of IP\_BUS, each IP\_BUS corresponding to a group of BI01. In chassis, IP\_BUS is interconnected through backplane bus. Between chassis, IP\_BUS is interconnected through optical fiber. Each BI01 supports three SFP optical modules, support star connections and bus connections.

## Main Parameters

Input Voltage	24VDC
Hot Swap	Support
Power Supply Redundant	Yes
Fiber Interface Type	SFP (Multi-mode, or Single-mode)
Fiber Interface Quantity	3
Fiber Type	LC
Fiber Module Type	Multi-mode, Single-mode
Communication Distance	≤20Km@ Single-mode ≤2Km@ Multi-mode
Size(H*D*W)	132mm*357mm*21mm
Weight	0.55kg



# Chassis Power Supply Module

Each chassis houses two PW01s arranged in a dual-redundant configuration and each has a separate input terminal on the chassis backplane. Each PW01 can support the power requirements for all the modules in the chassis. The PW have over-voltage and over-current protection.

## Main Parameters

Input Voltage Range (AC)	100~240VAC
Input Voltage Range (DC)	100~300VDC
Over-temperature Protection	Support
Hot Swap	Yes
Alarm Output	Power module has "NC+NO" alarm dry contact output
Power Quality Monitor	Maximum input voltage and transient pulse frequency
Size(H*D*W)	150mm*378mm*38mm
Weight	1.85kg



# SOFTWARE



## Software

### Architect Software Lists

Software Name	Functional Profile
Architect Program	<p>Comply with IEC61131-3 standard, support standard LD, FBD and ST programming language; One item supports simultaneous configuration of multiple control station engineering and user library engineering; Control station supports multi-task configuration;</p> <p>Support undisturbed incremental downloading; Independent simulation software and perfect hardware platform, supporting concurrent and multi-station simulation; Graphic configuration style, visual and easy to use.</p>
Architect Monitor	<p>Total-direction hardware monitoring, including status, fault and version; Real-time monitoring of system running status, including version, polling time, memory occupation, etc.</p>
Architect Event	<p>Powerful event management capacity; Support single control station event collection and management; Support soft and hard real-time SOE event classification and screening; Support snapshot function.</p>
Architect DTMLibrary	<p>Parameter setting, status monitoring and diagnosis of HART intelligent instrument.</p>
Architect Server	<p>Support OPC DA and OPC UA simultaneously; Support configuration software point table direct import; Support redundancy switch; Support data reading/writing from multiple control stations.</p>
Architect View	<p>Process, Monitor interface Alarm, Event, Trend, History Event Antisurge, Seal-Gas, Lube Oil and Speed Control</p>



# SOFTWARE



## Architect

### FBD programming

The screenshot displays the FBD programming environment. On the left is the **Project Manager** showing a tree structure with 'Reference Libraries', 'Application(1.0)', and 'BasicLibrary(1.0)'. Under 'Data Type', there is a list of 'Functions&Function B' including ACOS\_LR, ACOS\_R, ASIN\_LR, ASIN\_R, BLINK, BLINK\_I, BLINK\_R, CHK\_ERR, CLR\_ERR, DIV\_D, DIV\_DW, DIV\_LR, DIV\_R, EXP\_I\_LR, EXP\_I\_R, EXP\_LR, EXP\_R, and GetDeltaT. Above the main workspace is the **FBD Toolbar** with various icons for editing. The main workspace shows a table of variables and two sheets of **Function Block Diagrams** (FBDs) with interconnected blocks and connections.

Name	Comment	Data Type	Initial Value	CPC	Retain	Allow Disable
0001	A001	AI_Alarm_M				
0002	A002	AI_Alarm_M				
0003	A003	AI_Alarm_M				
0004	A004	AI_Alarm_M				
0005	LINK	AI_Alarm_M				

FBD Library

Function Block Diagrams

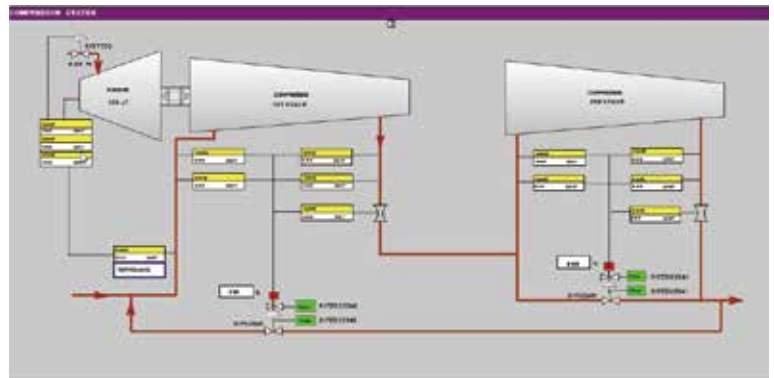
### LD programming

The screenshot shows the LD programming environment. On the left is a portion of a **Ladder Logic Diagram** (LD) with rungs and contacts. A context menu is open over a contact, listing options: 'Normally Open', 'Normally Closed', 'Positive', 'Negative', 'Insert to left', 'Insert to right', 'Insert to above', 'Insert to below', 'Contact', 'Coil', and 'Block object'. On the right is the **LD Toolbar** with icons for creating and editing logic elements.

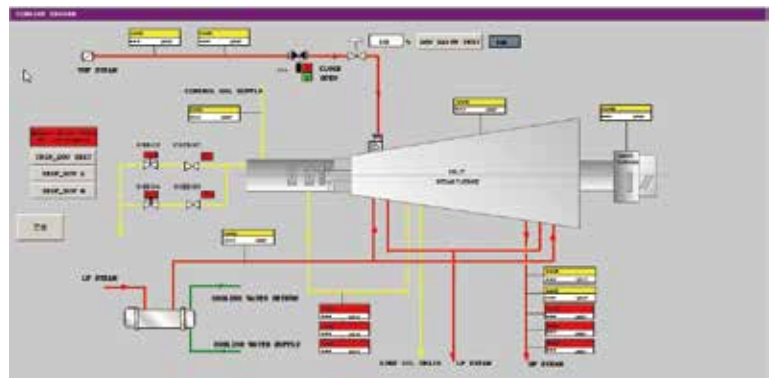
LD programming



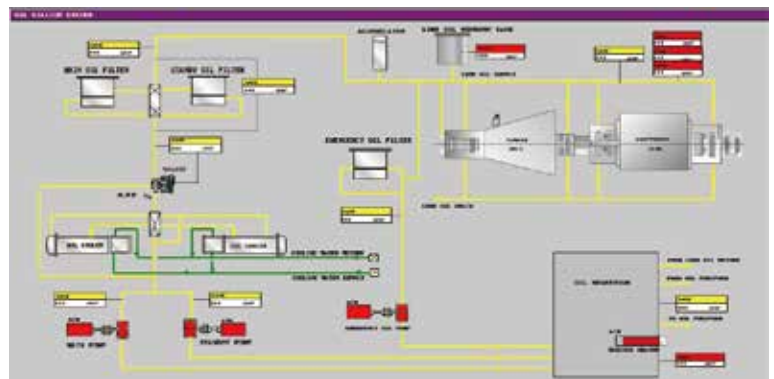
Ladder Logic



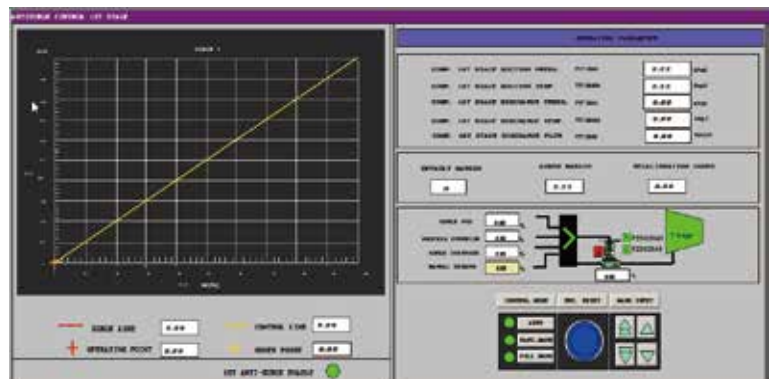
Compressor Control



Steam-Turbo Control



Seal-Gas Control



Antisurge Control

# APPLICATION



## Application

Safety related applications in industry process control :

- Emergency Shutdown System(ESD)
- Burner Management Systems(BMS)
- Fire alarm and Gas detector Systems(F&GS)
- Emergency Trip System(ETS)

Critical process plants control applications with higher requirements for reliability and availability:

- Gas Turbo Control(GTC)
- Integrated Turbine & Compressor Control(ITCC)
- Turbine Start-up & Sequencing
- Turbine Speed Control
- Steam Extraction Control
- Anti-surge Control
- Performance Control
- Load Share Control
- Temperature Quench Control



## Environment

System Power Supply	100~240VAC 100~300VDC
Operating Temperature	-10°C~60°C
Storage Temperature	-40°C~85°C
Relative Humidity	5%~95% ,No condensation
IP Class	IP20

Operating Altitude	≤3000m
Pollution Degree	II
Overvoltage Category	CAT II
Corrosive Environment	G3
Hazardous Locations	Zone2 Ex nA IIC T4





# STANDARD

Number	Standard number
Functional Safety	IEC 61508 Parts 1-7:2010
	IEC 61511 Parts 1-3:2004
	IEC 61131-6:2012
	ANSI/ISA 84.00.01 Parts 1-3:2004
	IEC 61010-1:2010
	IEC 61010-2-201:2013
	EN 62061:2005+A1:2013+A2:2015
Information Safety	IEC 62443-4-1:2016
	IEC 62443-4-2:2016
	ISA Secure EDSA 2.0.0
General Standard (Programmable Logic Controller)	IEC 61131-2:2007
Information Safety	EN 61000-6-2:2005
	EN 61000-6-4:2007
	IEC 61326-1:2012
	EN 61326-3-1:2008
Safety Standard (Power Supply Device)	EN 50178:1
Explosion-Proof	EN 60079-15:2010
Anti-Corrosion	ANSI/ISA S71.04
Application Standard	EN 50130-4:2011+A1:2014
	EN 54-2:1997+AC:1999+A1:2006
	NFPA 72:2016
	EN 50156-1:2015
	EN 298:2012
	EN 13611:2007+A2:2011
	NFPA 85:2015
	NFPA 86:2015 EN 12067-2:2004



# CERTIFICATE

## Certificate



Product Safety  
Functional Safety  
Cyber Security  
www.tuv.com  
ID: 968008006

No.: 968/FSP 1454.01/17

<b>Product tested</b>	Safety-Related Programmable Electronic System (2oo3 with diagnostics (2oo3D) and 3-2-1-0 mode of operation)	<b>Certificate holder</b>	Beijing Consen Technologies Co., Ltd. No.7 Anxiang Street, Area B Tianzhu Airport Economic Development Zone, Shunyi District Beijing, 101318 P.R. China
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**Type designation** TSxPlus System, Details the actual "Revision List"

<b>Codes and standards</b>	IEC 61508 Parts 1-7:2010 EN 62061:2005 + AC:2010 + A1:2013 + A2:2015 IEC 61131-6:2012 IEC 61131-2:2007 IEC 61326-3-1:2008 EN 61010-1:2010	EN 61010-2:2012 IEC 62443-4-1:2016 (65528/CDV) IEC 62443-4-2:2015 (65503/DC) ISASecure Embedded Device Security Assurance 2.0.0:2016 ISASecure EDSA 102:2016 Version 2.7
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**Intended application** The product complies with the requirements of the relevant standards (SC 3 and SIL 3 acc. to IEC 61508) and can be used in safety-related applications for Process Control, Burner Management System (BMS), Fire & Gas System (FGS), Emergency Shutdown System (ESD), Process Shutdown System (PSD), Emergency Trip System (ETS), Integrated Turbine / Compressor Control System (ITCC), High Integrity Pressure Protection System (HIPPS), where the safe state is the de-energized state, up to SIL 3.  
The product complies with the requirements of the security relevant standards (Security Level 1 (SL 1) acc. to IEC 62443-4-1, -4-2 and ISASecure EDSA 2.0.0 - Level 1 acc. to ISASecure EDSA 2.0.0 - Incorporating EDSA-102, Errata v2.7).  
Applications, where the demand state is the de-energized or energized state, up to SIL 3.  
The product was also reviewed in reference to the applicable requirements of IEC 61511-1:2016 + Cor.1:2016, EN 50156-1:2015, EN 54-2:1997 + AC:1999 + A1:2006, EN 208:2012, EN 12067-2:2004, NFPA 72:2015, NFPA 65:2015, NFPA 66:2015, ANSIISA-84.00.01-1:2004.

**Specific requirements** The instructions of Safety Manuals including security guidelines and User Manuals according to the revision list must be considered.  
Only the OSP01 is in addition approved according to EN 62061:2005 + A1:2013 + A2:2015.

Valid until 2022-07-07

The issue of this certificate is based upon an examination, whose results are documented in Report No. 968/FSP 1454.01/17 dated 2017-07-07.  
This certificate is valid only for products which are identical with the product tested. It becomes invalid at any change of the codes and standards forming the basis of testing for the intended application.

TÜV Rheinland Industrie Service GmbH  
Bereich Automation  
Funktionale Sicherheit  
Am Grauen Stein, 51106 Köln  
Certification Body Safety & Security for Automation & Grid

*H. Gall*  
Dipl.-Ing. Heinz Gall

www.fs-products.com  
www.tuvrsi.com



TÜV Rheinland Industrie Service GmbH, Am Grauen Stein, 51106 Köln, Germany  
Tel.: +49 221 635-1100 | Fax: +49 221 635-1330 | E-Mail: anfrage@tuvrsi.com

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**(1) TYPE EXAMINATION CERTIFICATE** 

(2) Equipment and Protective Systems intended for use in Potentially Explosive Atmosphere - Directive 2014/34/EU

(3) Type Examination Certificate Number

**TÜV 17 ATEX 8055 X** Blank, 00

(4) Equipment: **Safety-Related Programmable Electronic System T3xPlus**

(5) Manufacturer: **Beijing Consen Technologies Co., Ltd.**  
 (6) Address: **No.7 Anxiang Street, Area B, Tianzhu Airport Economic Development Zone, Shunyi District, Beijing 101318, P.R. China**

(7) This product and any acceptable variation therein are specified in the schedule to this certificate and the documents therein referred to.

(8) The TÜV Rheinland Zertifizierungsstelle für Explosionsschutz of TÜV Rheinland Industrie Service GmbH, Notified Body No. 0035 in accordance with Article 21 of the Council Directive 2014/34/EU of 26th February 2014, certifies this product which has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres, given in Annex II to the Directive.  
 The examination and test results are recorded in the confidential report GC / Ex 8055.06 / 17

(9) Compliance with the Essential Health and Safety Requirements, with the exception of those listed in the schedule of this certificate, has been assessed by reference to  
**EN 60079-0-2012+A11:2013 EN 60079-15:2010**

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This Type Examination Certificate relates only to the design and specification for construction of the equipment or protective system. It does not cover the process for actual manufacture or supply of the equipment or protective system, for which further requirements of the directive are applicable.

(12) The marking of the equipment shall include the following:

 **8 30 Ex nA nC IIC T4 Gc**

TÜV Rheinland Zertifizierungsstelle für Explosionsschutz Cologne, 2017-07-03

Dep. TÜV 17 ATEX 8055 X

This Type Examination Certificate without signature and stamp shall not be used. It may be considered only without signature. Changes or alterations are subject to approval by the TÜV Rheinland Industrie Service GmbH TÜV Rheinland Group. An Order Form 01118-036. Tel. +49 (0) 221 348-0 Fax. +49 (0) 221 348-119

www.tuv.com   Precisely Right.

**CERTIFICATE of Conformity** 

Registration No.: **AK 50384564 0001**

Report No.: **50085169 001**

Holder: **Beijing Consen Technologies Co., Ltd.  
 NO.7 Anxiang Street, Area B,  
 Tianzhu Airport Economic Development Zone,  
 Shunyi District, Beijing 101318  
 P. R. China**

Product: **Control Unit  
 (Safety-Related Programmable Electronic System)**

Identification: **Type Designation: T3xPlus  
 Serial No.: Engineering Sample  
 Remark: Refer to test report 50085169 001 for details.**

Tested acc. to: **ANSI/ISA 71.24-2003**

The certificate of conformity refers to the above mentioned product. This is to certify that the specimen is in conformity with the assessment requirement mentioned above. This certificate does not imply assessment of the production of the product and does not permit the use of a TÜV Rheinland mark of conformity.

Date: 28.07.2017

 Certification Body  
  
 Mai Miao

TÜV Rheinland LGA Products GmbH - Tillystraße 2 - 90431 Nürnberg

# CERTIFICATE

## Certificate



968/EDSA 1002.00/17



<b>Product tested</b>	Safety-Related Programmable Electronic System	<b>Certificate holder</b>	Beijing Consen Technologies Co., Ltd. No.7 Anxiling Street, Area B Tianzhu Airport Economic Development Zone, Shunyi District Beijing, 101318 P.R. China
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**Type designation**

TSxPlus V1.0

TSxPlus CM01 - Communication Module  
Rev. CM01-A-V001

Software  
RTS1 - CRC32: 4CD4665F  
RTS1CRC - CRC32: 9906FE90  
cag.f/w2 - CRC32: 5551E099  
p1020nfb-pd.dts - CRC32: 4B91046A  
u-boot-em.bin - CRC32: CCF94AE0  
uImage - CRC32: 190648C5

Power MCU:  
CM01\_APP\_U40\_01.hex - CRC32: C999481A  
CM01\_L1BOOT\_U40\_01.hex - CRC32: 9FCDB0B4  
CM01\_L2BOOT1\_U40\_01.hex - CRC32: 0249E22E  
CM01\_L2BOOT2\_U40\_01.hex - CRC32: 1B47326B

FPGA:  
CM01\_FPGA\_U5\_01.tbf - CRC32: EE4AEB6F

**Scope and result**

ISASecure Embedded Device Security Assurance (EDSA) 2.0.0.  
(incorporating EDSA-102, Errata v2.1)

The system complies with the requirements of ISASecure EDSA 2.0.0 - Level 1.

**Specific requirements**

For the use of the system the safety and security considerations as documented in the product and user guides released by the manufacturer must be considered.

The issue of this certificate is based upon an examination, whose results are documented in Report No. 968/FSP 1454.01/17 dated 2017-07-07.  
This certificate is valid only for products which are identical with the product tested.

**TÜV Rheinland Industrie Service GmbH**  
Bereich Automation  
Funktionale Sicherheit  
Am Grauen Stein, 51105 Köln

Köln, 2017-07-07

Certification Body Safety & Security for Automation & Oct


*H. Gall*  
Dipl.-Ing. Heinz Gall

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Tel.: +49 201 894-0 | Fax: +49 201 894-1000 | E-Mail: industrie-service@tuv.com

**CERTIFICATE** 

of Conformity  
Low Voltage Directive 2014/35/EU

Registration No.: AN 50382091 0001  
Report No.: 16806854 001

**Holder:** Beijing Consen Technologies Co., Ltd.  
NO.7 Anxiang Street, Area B,  
Tianzhu Airport Economic Development Zone,  
Shunyi District, Beijing 101318  
P. R. China

**Product:** Control Unit  
(Safety-Related Programmable Electronic System)

**Identification:** Type Designation: Tbx12a V1.0  
Serial No.: Engineering Sample  
Remark: Refer to test report 16806854 001 for details.

This certificate of conformity is based on an evaluation of a sample of the above mentioned product. Technical Report and documentation are at the License Holder's disposal. This is to certify that the tested sample is in conformity with Annex I of Council Directive 2014/35/EU, referred to as the Low Voltage Directive. This certificate does not imply assessment of the series-production of the product and does not permit the use of a TÜV Rheinland mark of conformity. The holder of the certificate is authorized to use this certificate in connection with the EC declaration of conformity according to Annex IV of the Directive.

 Certification Body  
*Mai Mao*  
Date: 28.08.2017  
Mai Mao

TÜV Rheinland LGA Products GmbH - Tillystraße 2 - 90431 Nürnberg

**CE** The CE marking may be used if all relevant and effective EC Directives are complied with.

**CERTIFICATE** 

of Conformity  
EC Council Directive 2014/30/EU  
Electromagnetic Compatibility

Registration No.: AE 50382089 0001  
Report No.: 16806858 001

**Holder:** Beijing Consen Technologies Co., Ltd.  
NO.7 Anxiang Street, Area B,  
Tianzhu Airport Economic Development Zone,  
Shunyi District, Beijing 101318  
P. R. China

**Product:** Control Unit  
(Safety-Related Programmable Electronic System)

**Identification:** Type Designation: Tbx12a V1.0  
Serial No.: Engineering Sample  
Remark: Refer to test report 16806858 001 for details.

**Tested acc. to:** EN 61326-1:2013

This certificate of conformity is based on an evaluation of a sample of the above mentioned product. Technical Report and documentation are at the License Holder's disposal. This is to certify that the tested sample is in conformity with all provisions of Annex III of Council Directive 2014/30/EU. This certificate does not imply assessment of the production of the product and does not permit the use of a TÜV Rheinland mark of conformity. The holder of the certificate is authorized to use this certificate in connection with the EC declaration of conformity according to the s.m. Directive.

 Certification Body  
*Sun Likun*  
Date: 28.08.2017  
Sun Likun

TÜV Rheinland LGA Products GmbH - Tillystraße 2 - 90431 Nürnberg

**CE** The CE marking may only be used if all relevant and effective EC Directives are complied with.