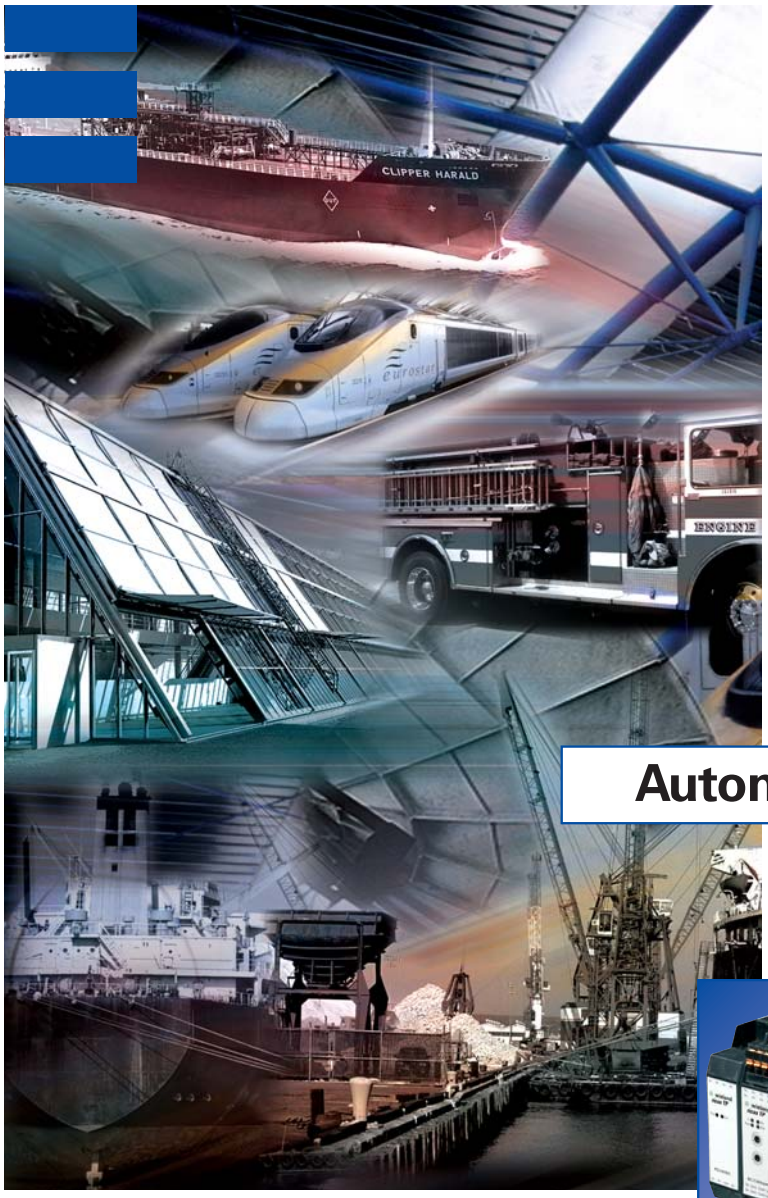
wieland

Elektrische
Verbindungen



ricos TP

Automation system

for broad range of environmental conditions

- **– Temperature**
- **– Interface immunity**
- **– Hot Swap**
- **– Modular**
- **– Cycle time**
- **– Power PC**

Information

ricos TP

ricos TP
The automation system for outdoor use

Areas of application
Due to its technical qualification, ***ricos*** TP can be used economically in all types of large-capacity and public vehicles and in areas with increased requirements.

Examples include:

- ❒ Track vechicles
- ❒ Construction vechicles (excavators, cranes)
- ❒ Special-purpose vechicles (Fire engines, dustbin carts)
- ❒ Buses
- ❒ Locations in outdoor installations or under hall ceilings…

Typical applications in vechicles are:

- ❒ Management of cabin information
- ❒ Control of drive mechanism
- ❒ Engine management
- ❒ Door control
- ❒ Control of air conditioning systems
- ❒ Brake control
- ❒ Passenger information
- ❒ Connection to the vechicle bus and train bus

Information

ricos TP

We begin where others stop!

State of the Art
ricos TP has been developed using the latest technology. When selecting the components and system design, a highly qualified team of engineers ensured that the latest technical developments in electronics and semi-conductor technology were used wherever possible.

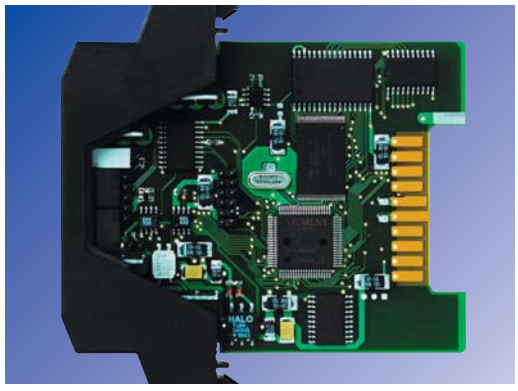
ricos TP therefore stands out due to the following features:

- ❒ An extremely compact design with a maximum level of performance
- ❒ Exceptionally high computing capacity of the CPUs
- ❒ Very fast system throughput
- ❒ Extreme high level of accuracy and reliability

Suitable for railway applications
ricos TP has been developed for use in vehicles.
During the product design, compliance with the European standard for electronics in track vehicles was therefore ensured. Strict tests have certified its compliance with the norms.

ricos TP complies with the following norms:

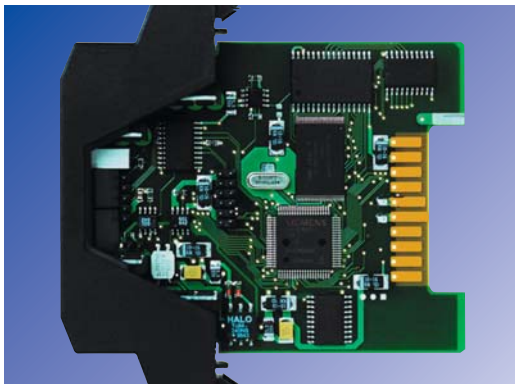
- ❒ Mechanical
- ❒ EN 50 155, Tx (-40 °C to +70 °C)
- ❒ Electromagnetic: EN 50 121-3-2



Subject to technical modifications

ricos TP

Benefits for the user



Modular and small

- ❒ Suitable for locations where space is at a premium
- ❒ Can be used in signal networks of 24 V DC and 110 V DC. Other voltages available on request. It has therefore gained world-wide acceptance
- ❒ Modular housing, width 22.5 mm, for installation on DIN rails

Satisfies extensive requirements

- ❒ In extreme environmental conditions – suitability for railway applications in accordance with EN 50155 Temperature class Tx (-40 ...+70 °C) and EN 50121-3-2

Cost-effective

- ❒ Use of modern integrated components
- ❒ Optimum number of channels per module

Easy to service

- ❒ The PCBs of the individual modules can be replaced in the energised state, without having to dismantle the complete structure (hot swap)
- ❒ All signal terminals and electronic PCBs have plug-in connections

Multi-functional

- ❒ Control with local I/O
- ❒ Decentralised I/O on the bus
- ❒ Programmable I/O islands on the CANopen bus with master/slave function

Programmable with iCon-L®

- ❒ Graphical, symbolic tool from ProSign

IEC 61131

- ❒ CoDeSys from 3S
- ❒ Simple adaptation to other programming tools

Technical properties

ricos TP

Technical properties

Communication

- ❒ The connection of up to 127 I/O islands on one CAN bus enables almost unlimited system sizes
- ❒ The bus connections are electrically isolated
- ❒ Other buses are: Profibus, LON, MVB
- ❒ Signal capacity per I/O island on the CAN
- ❒ Type 10 I/O modules
- ❒ Type 80 binary input/output signals or
- ❒ Type 40 analogue input signals or
- ❒ Type 20 analogue output signals or
- ❒ Mixture of binary and analogue signals

DIN rail installation

- ❒ Rapid and cost-effective installation and earthing
- ❒ Secure locking of the I/O block using end clamps

Process signals

- ❒ 24 V DC binary inputs/outputs
- ❒ 7 mA fitting current
- ❒ 110 V DC binary inputs/outputs
- ❒ Analogue standardised signals for inputs and outputs ± 10 V, 0...20 mA, 4...20 mA
- ❒ Resistance thermometer PT 100
- ❒ Screw or spring-loaded terminals, max. 2.5 mm^2

Electrical Isolation

- ❒ The process signals compared to the internal bus
- ❒ The signal groups against each other

Optimised, high capacity processors

- ❒ Siemens 80C164 / 167 on the communication modules
- ❒ Power PC, the fastest PLC 66 MHz, 16 MB Ram, 4 MB Flash Ethernet, CAN, RS232, USB LCD-screen with digital connection

Communication modules

ricos TP

Dimensions (mm): H x W x D
22,5 x 99,5 x 114,5

Modular bus coupler CANopen

Approvals: CE, Railway norm EN 50155
In preparation UL, CSA, GL

Modular bus coupler Profibus DP

Approvals: CE, Railway norm EN 50155
In preparation UL, CSA, GL

Description		Type	Part No.	Box Qty	Type	Part No.	Box Qty
Bus coupler with diagnostics function			TP BC-CAN	83.039.0120.0 1		TP BC-DP	83.039.0121.0 1
Display of operating modes							
Send Tx:	Yellow LED	The CAN module processes the data of the I/O modules and establishes			Send Tx :	Yellow LED	
Receive Rx:	Yellow LED	the link to the CAN environment. Due to the use of the Siemens 80C167			Receive Rx :	Yellow LED	
Power ok:	Yellow LED	processor, it is possible to download and run a local PLC program via the			Power ok :	Yellow LED	
Error CAN:	Red LED	CAN in addition to the communications software.			Error DP :	Red LED	
System data							
Maximum number of nodes		127			125		
Transmission medium		3 core, shielded copper cable			2 core, shielded copper cable		
Parameter settings via rotary switch		Bus parameter, PLC program, CAN address, Baud rate			DP address and baud rate		
Maximum network expansion		0 - 500 m (dependent on baud rate/cable)			(dependent on baud rate/cable)		
Baud rate		10 kBaud.....1 MBaud			9,6 kBaud up to 12 MBaud		
Processing speed							
Addressing of the Ethernet TCP/IP		–					
Bus connection		Plug-in connectins in screw or spring loaded technology 2,5 mm^2			9 pole D-Sub		
Technical data							
Device profile		I/O module			I/O module		
Number of I/O modules per node		15			15		
CPU Type		Siemens 80C167					
Memory							
Address setting		2 hexadecimal switches			2 hexadecimal switches		
Operating system							
Power consumption		120 mA without I/O modules			120 mA without I/O modules		
Operating voltage		5 V DC via 24 V DC power supply (83.039.0100.0)			5 V DC via 24 V DC power supply (83.039.0100.0)		
Equipotential isolation		All serial interfaces			All serial interfaces		
Insulation voltage		350 V AC, 50 Hz (system/supply)			350 V AC, 50 Hz (system/supply)		
Basic norms		EN 50155, EN 50121-3-2			EN 50155, EN 50121-3-2		
Data interfacing		ISO/DIS 11898					
Earthing		Cable shield on seperate TS 35 DIN rail, earthing of shields,			Cable shield on seperate TS 35 DIN rail, earthing of shields,		
		digital ground, analgue ground and bus earth in accordance			digital ground, analgue ground and bus earth in accordance		
		with earthing concept in the ***ricos*** TP manual.			with earthing concept in the ***ricos*** TP manual.		
Connection technology		Plug-in connections in screw or spring-loaded technology			Plug-in connections in screw or spring-loaded technology		
Wire range for finely stranded/single core		0,14 mm^2 – 1,5 mm^2 / 0,5 mm^2 – 2,5 mm^2			0,14 mm^2 – 1,5 mm^2 / 0,5 mm^2 – 2,5 mm^2		
Ambient temperature		EN 50155 Tx -40 °C / +70 °C (+85 °C, 10 min)			EN 50155 Tx -40°C / +70°C (+85° C, 10 min)		
Storage temperature		-40 °C / +85 °C			-40 °C / +85 °C		
Protective varnish		Peters SL 1309 in accordance with the railway norm			Peters SL 1309 in accordance with the railway norm		
Humidity		0 to 80%			0 to 80%		
Programming tool							
Diagnositics information		Via the bus: module failure, configuration, short circuit,					
		wire breakage, excess temperature, contact monitoring					
Protection against incorrect connection		Via software			Via software		
Connection coding		Coding pins			Coding pins		
Insertion and withdrawal in energised state		yes			yes		
Connections		Greenbus, CAN			Greenbus, Profibus DP		
Accessories							
ricos TP mounting set			83.039.0190.0			83.039.0190.0	
ricos TP connector, screw version			83.039.0190.1			83.039.0190.1	
ricos TP connector, spring-loaded version			83.039.0190.2			83.039.0190.2	
CAN configurations and diagnostics tool			83.039.0190.5				

Subject to technical modifications

Communication modules

ricos TP

Modular bus coupler MVB

Dimensions (mm): H x W x D
22,5 x 99,5 x 114,5

Approvals: CE, Railway norm EN 50155
In preparation UL, CSA, GL

Description	Type	Part No.	Box Qty	Type	Part No.	Box Qty
Bus coupler with diagnostics function	TP BC-MVB	83.039.0122.0	1			
Display of operating modes						
System data						
Maximum number of nodes						
Transmission medium	RS 485 optical or transformer-based					
Parameter settings via rotary switch	MVB address					
Maximum network expansion						
Baud rate	up to 1,5 Mbit					
Processing speed						
Addressing of the Ethernet TCP/IP	–					
Bus connection	Plug-in connectins in screw or spring loaded technology 2,5 mm^2					
Technical data						
Device profile	I/O module					
Number of I/O modules per node	type. 10; maximal 15					
CPU Type	SAK-XC161CJ-16F40F Infeneon with 128 kByte flash					
Memory	128 kByte internal, 512 kByte external, 512 kByte traffic RAM					
Address setting	2 hexadecimal switches					
Operating system						
Power consumption	120 mA					
Operating voltage	5 V DC via 24 V DC power supply (83.039.0100.0)					
Equipotential isolation	Optocoupler/ transformer					
Insulation voltage	350 V AC, 50 Hz (system/supply)					
Basic norms	EN 50155, EN 50121-3-2					
Data interfacing						
Earthing	Cable shield on seperate TS 35 DIN rail, earthing of shields,					
	digital ground, analgue ground and bus earth in accordance					
	with earthing concept in the ***ricos*** TP manual.					
Connection technology	Plug-in connections in screw or spring-loaded technology					
Wire range for finely stranded/single core	0,14 mm^2 – 1,5 mm^2 / 0,5 mm^2 – 2,5 mm^2					
Ambient temperature	EN 50155 Tx -40 °C / +70 °C (+85 °C, 10 min)					
Storage temperature	-40 °C / +85 °C					
Protective varnish	Peters SL 1309 in accordance with railway norm					
Humidity	0 to 80%					
Programming tool						
Diagnositics information						
Protection against incorrect correction	Via software					
Connection coding	Coding pins					
Insertion and withdrawal in energised state	yes					
Connections	Greenbus, MVB					
Accessories						
ricos TP mounting set		83.039.0190.0				
ricos TP connector, screw version		83.039.0190.1				
ricos TP connector, spring-loaded version		83.039.0190.2				
CAN configurations and diagnostics tool						

Subject to technical modifications

Communication modules

ricos TP

Dimensions (mm): H x W x D
45 x 99,5 x 114,5

Power PC RS232, CAN, Ethernet Interface

Approvals: CE, Railway norm EN 50155
In preparation UL, CSA, GL

Description		Type	Part No.	Box Qty	Part No.
Bus coupler with diagnostics function		TP PC-CANopen	83.039.0110.0	1	**Working implementation**
Display of operating modes					When using the power PC and the Linux, ***ricos*** TP ricos TP
Send Tx:	Yellow LED				achieves unsurpassed performance levels in processing speed,
Receive Rx:	Yellow LED				memory size and connection capability via buses. In addition to
Power ok:	Yellow LED				programming in accordance with IEC 61131,
Error CAN:	Red LED				other high-level languages and ANSI-C can be implemented.
System data					Apart from Linux, the following operating systems are available:
Maximum number of nodes					VxWorks, Windows CE, PSOS, QNX, eCos or Linux RT.
Transmission medium		3 core, shielded copper cable			
Parameter settings via rotary switch		CAN Address			
Maximum network expansion		0 - 500 m (dependent on baud rate/cable)			**PC implementation**
Baud rate		10 kBaud.....1 MBaud (CAN); 10 MBaud (10 Base-T)			The power PV module is a computer system that is suita-
Processing speed		logically 99 MIPS			ble for railway applications with the Linux operating
Addressing of the Ethernet TCP/IP		Static (flash or dynamic (DHCP server)			system. It can be programmed in the usual programming
Bus connection					languages C or C++. The keyboard, mouse and solid-state
Technical data					memory are connected via the USB interface. An LCD
Device profile		I/O module			screen is connected directly to the LCD interface of the
Number of I/O modules per node					power PC. As a PC, themodule is suitable for all the appli-
CPU Type		Power PC MPC 823e (industrial); 66 MHz			cations which can be structured within 16 MB.
Memory		16 MB SDRam; 4 MB Flash			
Address setting		2 hexadecimal switches			
Operating system		Linux, (VxWorks, Windows CE, PSOS,QNX,eCos, RT-Linux)*			**SPS implementation**
Power consumption		800 mA			In this case, the power PC module is operated as a fast CPU
Operating voltage		3,3 V DC via 24 V DC power supply (83.039.0100.0)			with connected I/Os. It supports the integrated field buses
Equipotential isolation		All serial interfaces			CANopen (master/slave) and Ethernet. Furthermore, it can
Insulation voltage		350 V AC, 50 Hz (system/supply)			be combined with other field bus modules e.g. Profibus DP.
Basic norms		EN 50155, EN 50121-3-2			The programming is carried out under IEC 61131 (CodeSys,
Data interfacing		ISO / DIS 11898; IEEE 802.3; LCD (1024x768; 256 colours)			Multiprog) on the Linux level or a real-time operating system
Earthing		Cable shield on separate TS 35 DIN rail, earthing of shields,			e.g. VxWorks. Due to the implemented technologies, the
		digital ground, analogue ground and bus earth in accordance			module is one of the fastest PLCs on the market and also
		with earthing concept in the ***ricos*** TP manual			complies with the norms for electronics on track vehicles
Connection technology		Plug-in connections in screw or spring-loaded technology			(EN 155, EN 121-3-2).
Wire range for finely stranded/single core		0,14 mm^2 – 1,5 mm^2 / 0,5 mm^2 – 2,5 mm^2			
Ambient temperature		EN 50155 Tx -40 °C / +70 °C (+85 °C, 10 min)			
Storage temperature		-40 °C / +85 °C			
Protective varnish		Peters SL 1309 in accordance with the railway norm			**Visualisation device (HMI)**
Humidity		0 to 80%			In this function, both an LCD screen and binary input
Programming tool		CodeSys, Multiprog			modules are connected. It is therefore possible e.g. to
Diagnositics information		Via the bus: module failure, configuration, short circuit, wire breakage,			equip a train cab that has a display and operator buttons in
		excess temperature, contact monitoring of switches, I/O channels, low voltage			accordance with UIC with a computer that is completely
Protection against incorrect connection		Via software			suited to railway applications. On the power PC, it is possi-
Connection coding		Coding pins			ble for individual diagnostics and display software or
Insertion and withdrawal in energised state		yes			standardised MMI systems to run under Linux.
Connections		RS 232, 2x CAN, Ethernet, Greenbus			
		USB Host / Slave Controller			
Accessories					
ricos TP mounting set			83.039.0190.0		83.039.0190.0
ricos TP connector, screw version			83.039.0190.1		83.039.0190.1
ricos TP connector, spring-loaded version			83.039.0190.2		83.039.0190.2
CAN configurations and diagnostics tool			83.039.0190.5		

* optional

Subject to technical modifications

Power Supplies

ricos TP

The module converts a disrupted, non-stabilised direct voltage into the stabilised supply voltages of 5 V DC and 3,3 V DC. Then supply of the connected modules is carried out via the internal green-bus.

Dimensions (mm): H x W x D
22,5 x 99,5 x 114,5

Power Supply 24 V DC

Approvals: CE, Railway norm EN 50155
In preparation UL, CSA, GL

Power Supply 110 V DC

Approvals: CE, Railway norm EN 50155
In preparation UL, CSA, GL

Description	Type	Part No.	Box Qty	Type	Part No.	Box Qty
Power Supply	TP PS 24 V DC	83.039.0100.0	1	TP PS 110 V DC	83.039.0101.0	1
Display of operating modes						
Power ok: Yellow LED						
Error: Red LED						
Short circuit						
Low voltage						
System data						
Input voltage range	24 V DC -30%/+35%; -40% (100 ms); -100% (10 ms)			110 V DC		
Output voltage	5 V DC; 3,3 V DC			5 V DC; 3,3 V DC		
Maximum output current	500 mA (5 V); 3 A (3,3 V)			500 mA (5 V); 3 A (3,3 V)		
Reverse polarity protection	yes (Diode)			yes (Diode)		
Equipotential isolation	2,5 kV in accordance with EN 50155					
Processing speed	2 ms					
Addressing of the Ethernet TCP/IP	5 pole connector, screw					
Bus connection						
Technical data						
Input voltage range	24 V DC -30%/+35%; -40% (100 ms); -100% (10 ms)			110 V DC		
Output voltage	5 V DC; 3,3 V DC			5 V DC; 3,3 V DC		
Maximum output current	500 mA (5 V); 3 A (3,3 V)			500 mA (5 V); 3 A (3,3 V)		
Reverse polarity protection	yes (Diode)			yes (Diode)		
Equipotential isolation	2,5 kV in accordance with EN 50155			2,5 kV in accordance with EN 50155		
Connection technology	Plug-in connections in screw or spring-loaded technology			Plug-in connections in screw or spring-loaded technology		
Wire range for finely stranded/single core	0,14 mm^2 – 1,5 mm^2 / 0,5 mm^2 – 2,5 mm^2			0,14 mm^2 – 1,5 mm^2 / 0,5 mm^2 – 2,5 mm^2		
Ambient temperature	EN 50155 Tx -40 °C / +70 °C (+85 °C, 10 min)			EN 50155 Tx -40 °C / +70 °C (+85 °C, 10 min)		
Storage temperature	-40 °C / +85 °C			-40 °C / +85 °C		
Protective varnish	Peters SL 1309 in accordance with the railway norm			Peters SL 1309 in accordance with the railway norm		
Humidity	0 to 80%			0 to 80%		
Connection coding	Coding pins			Coding pins		
Insertion and withdrawal in energised state	yes			yes		
Accessories						
ricos TP mounting set		83.039.0190.0			83.039.0190.0	
ricos TP connector, screw version		83.039.0190.1			83.039.0190.1	
ricos TP connector, spring-loaded version		83.039.0190.2			83.039.0190.2	

Subject to technical modifications

Binary input modules

ricos TP

The modules offer 8 binary inputs. Each channel is isolated against the others as well as the system electronics. The continuous input current of 7 mA guarantees a high level of contact stability even in polluted environments (fritting effect). This is available as a continuous current so that a high level of signal reliability is also ensured in the event of vibrations. Due to the potential-free design, the inputs can be switched in series and used for positive or negative switching (current source and current sink).

8 Binary inputs 24 V DC positive or negative switching
Approvals: CE, Railway norm EN 50155
In preparation UL, CSA, GL

8 Binary inputs 110 V DC positive or negative switching
Approvals: CE, Railway norm EN 50155
In preparation UL, CSA, GL

Dimensions (mm): H x W x D
22,5 x 99,5 x 114,5

Description		Type	Part No.	Box Qty	Type	Part No.	Box Qty
Binary input modules		TP 8I DC 24 V	83.039.0130.0	1	TP 8I DC 110 V	83.039.0131.0	1
Display of operating modes							
Error (Greenbus):	Red LED						
Power ok:	Yellow LED						
Channel status (high):	8 x Yellow LED						
System data							
Number of inputs		8, two pole			8, two pole		
Number of outputs		–			–		
Operating voltage		3,3 V DC via 24 V DC power supply (83.039.0100.0)			3,3 V DC via 24 V DC power supply (83.039.0100.0)		
Power consumption		120 mA			300 mW		
Parameter settings via rotary switch		Greenbus address			Greenbus address		
Technical data							
Switching level „0" (EN 61131-2; Type 1)		0....8 V DC			< 25 V DC		
Switching level „1" (EN 61131-2; Type 1)		18...32 V DC			> 40 V DC		
Input current at U_{high} / U_{low}		7 mA / 0 mA			1,15 mA / 0 mA		
Input circuit		positive or negative switching			positive or negative switching		
Software filter		0 ms, 4 ms, 8 ms			–		
Output voltage (EN 61131-3; Type 1)							
Output current per module							
Maximum total current per module							
Output circuit							
Switching times							
Output protection							
Equipotential isolation		All channels isolated against each other and the electronics			All channels isolated against each other and the electronics		
Insulation voltage		350 V AC, 50 Hz (system/supply)			2,5 kV, 50 Hz (system/supply)		
Basic norms		EN 50155, EN 50121-3-2			EN 50155, EN 50121-3-2		
Connection technology		Plug-in connections in screw or spring-loaded technology			Plug-in connections in screw or spring-loaded technology		
Wire range for finely stranded/single core		0,14 mm^2 – 1,5 mm^2 / 0,5 mm^2 – 2,5 mm^2			0,14 mm^2 – 1,5 mm^2 / 0,5 mm^2 – 2,5 mm^2		
Ambient temperature		EN 50155 Tx -40 °C / +70 °C (+85 °C, 10 min)			EN 50155 Tx -40 °C / +70 °C (+85 °C, 10 min)		
Storage temperature		-40 °C / +85 °C			-40 °C / +85 °C		
Protective varnish		Peters SL 1309 in accordance with the railway norm			Peters SL 1309 in accordance with the railway norm		
Humidity		0 to 80%			0 to 80%		
Connection coding		Coding pins			Coding pins		
Insertion and withdrawal in energised state		yes			yes		
Accessories							
ricos TP mounting set			83.039.0190.0			83.039.0190.0	
ricos TP connector, screw version			83.039.0190.1			83.039.0190.1	
ricos TP connector, spring-loaded version			83.039.0190.2			83.039.0190.2	

Subject to technical modifications

Binary output modules

ricos TP

The modules offer 8 binary outputs. Each channel is isolated against the others as well as the system electronics. An external power supply for the electrically isolated circuits is not necessary. Due to the potential-free design, the outputs can be switched in series and used for positive or negative switching (current source and current sink).

8 Binary outputs 24 V DC; 0,5 A positive or negative switching
Approvals: CE, Railway norm EN 50155
In preparation UL, CSA, GL

8 Binary outputs 110 V DC; 1 A positive swiching
Approvals: CE, Railway norm EN 50155
In preparation UL, CSA, GL

Dimensions (mm): H x W x D
22,5 x 99,5 x 114,5

Description		Type	Part No.	Box Qty	Type	Part No.	Box Qty
Binary output modules		TP 8O DC 24/0,5	83.039.0140.0	1	TP 8O DC 110/1	83.039.0141.0	1
Display of operating modes							
Error (Greenbus):	Red LED						
Power ok:	Yellow LED						
Channel status (high):	8 x Yellow LED						
System data							
Number of inputs		–					
Number of outputs		8, two pole					
Operating voltage		3,3 V DC via 24 V DC power supply (83.039.0100.0)					
Power consumption		120 mA					
Parameter settings via rotary switch		Greenbus address					
Technical data							
Switching level „0“ (EN 61131-2; Type 1)							
Switching level „1“ (EN 61131-2; Type 1)							
Input current at U_{high} / U_{low}							
Input circuit							
Software filter							
Output voltage (EN 61131-3; Type 1)		max. 60 V DC			max. 160 V DC		
Output current per module		max. 500 mA			max. 1 A DC		
Maximum total current per module		max. 8 A DC			max. 8 A DC		
Output circuit		positive or negative switching			positive switching		
Switching times		type. 1 ms			type. 100 ms		
Output protection		Short-circuit and overload protection polyswitch			Short-circuit and overload protection polyswitch		
Equipotential isolation		All channels isolated against each other and the electronics			Group (4 channels) isolated against each other and the electronics		
Insulation voltage		350 V AC, 50 Hz (system/supply)			2,5 kV, 50 Hz (system/supply)		
Basic norms		EN 50155, EN 50121-3-2			EN 50155, EN 50121-3-2		
Connection technology		Plug-in connections in screw or spring-loaded technology			Plug-in connections in screw or spring-loaded technology		
Wire range for finely stranded/single core		0,14 mm^2 – 1,5 mm^2 / 0,5 mm^2 – 2,5 mm^2			0,14 mm^2 – 1,5 mm^2 / 0,5 mm^2 – 2,5 mm^2		
Ambient temperature		EN 50155 Tx -40 °C / +70 °C (+85 °C, 10 min)			EN 50155 Tx -40 °C / +70 °C (+85 °C, 10 min)		
Storage temperature		-40 °C / +85 °C			-40 °C / +85 °C		
Protective varnish		Peters SL 1309 in accordance with the railway norm			Peters SL 1309 in accordance with the railway norm		
Humidity		0 to 80%			0 to 80%		
Connection coding		Coding pins			Coding pins		
Insertion and withdrawal in energised state		yes			yes		
Accessories							
ricos TP mounting set			83.039.0190.0			83.039.0190.0	
ricos TP connector, screw version			83.039.0190.1			83.039.0190.1	
ricos TP connector, spring-loaded version			83.039.0190.2			83.039.0190.2	

Subject to technical modifications

Analoge Module

ricos TP

The modules offer analogue inputs and outputs for standard voltages and currents. A common reference potential is defined as well as the electrical isolation against the system electronics. The choice between current or voltage inputs is carried out via plug-in jumpers.

4 analogue inputs / 2 analogue outputs
0 (4)-20 mA, 0-10 V, +/-10 V
Approvals: CE, Railway norm EN 50155
In preparation UL, CSA, GL

2 analogue inputs and outputs
+/-20 mA, +/-10 V
Approvals: CE, Railway norm EN 50155
In preparation UL, CSA, GL

Dimensions (mm): H x W x D
22,5 x 99,5 x 114,5

Description	Type	Part No.	Box Qty	Type	Part No.	Box Qty
Analogue input/output modules	TP 4AI2AO U/I	83.039.0170.0	1	TP 2AO U/I	83.039.160.0	1
Display of operating modes						
Error LED (Greenbus): red						
Power LED: yellow						
System data						
Number of inputs	4 analogue inputs			2 analogue inputs		
Number of outputs	2 analogue outputs			2 analogue outputs		
Operating voltage	5/3,3 V DC via 24 V DC power supply (83.039.0100.0)			5/3,3 V DC via 24 V DC power supply (83.039.0100.0)		
Power consumption	100/120 mA					
Parameter settings via rotary switch	Greenbus address			Greenbus address		
Technical data						
Measuring range for input/output (current)	0-20 mA, 4-20 mA			± 20 mA		
Measuring range for input/output (voltage)	+/-10 V, 0-10 V			± 10 V		
Conversion time	6 ms for 4 inputs and 2 ms for outputs			6 ms for 4 inputs and 2 ms for outputs		
Conversion method						
Input/output resistance (current)	125 Ohm; 500 Ohm			125 Ohm; 500 Ohm		
Input/output resistance (voltage)	100 kOhm, 5 kOhm			100 kOhm, 5 kOhm		
Overvoltage protection	+/- 36 V			+/- 36 V		
Resolution	12 Bit			12 Bit		
Accuracy (inout/output)	0,4% (optional 0,2%); 0,2%			0,4% (optional 0,2%); 0,2%		
Temperature drift	maximal 40 ppm / K			maximal 40 ppm / K		
Common-mode rejection	> 60 dB			> 60 dB		
Common-mode rejection	> 60 dB			> 60 dB		
Linearisation method (input)	via user program			via user program		
Equipotential isolation	Channels isolated against the electronics, common reference potential			Channels isolated against the electronics, common reference potential		
Insulation voltage	350 V AC, 50 Hz (system/supply)			350 V AC, 50 Hz (system/supply)		
Basic norms	EN 50155, EN 50121-3-2			EN 50155, EN 50121-3-2		
Connection technology	Plug-in connections in screw or spring-loaded technology			Plug-in connections in screw or spring-loaded technology		
Wire range for finely stranded/single core	0,14 mm^2 – 1,5 mm^2 / 0,5 mm^2 – 2,5 mm^2			0,14 mm^2 – 1,5 mm^2 / 0,5 mm^2 – 2,5 mm^2		
Ambient temperature	EN 50155 Tx -40 °C / +70 °C (+85 °C, 10 min)			EN 50155 Tx -40 °C / +70 °C (+85 °C, 10 min)		
Storage temperature	-40 °C / +85 °C			-40 °C / +85 °C		
Protective varnish	Peters SL 1309 in accordance with the railway norm			Peters SL 1309 in accordance with the railway norm		
Humidity	0 to 80%			0 to 80%		
Connection coding	Coding pins			Coding pins		
Insertion and withdrawal in energised state	yes			yes		
Accessories						
ricos TP mounting set		83.039.0190.0			83.039.0190.0	
ricos TP connector, screw version		83.039.0190.1			83.039.0190.1	
ricos TP connector, spring-loaded version		83.039.0190.2			83.039.0190.2	

Subject to technical modifications

Temperature Module

ricos TP

The module offers 4 analogue inputs for measuring resistance or temperatures via PT 100 elements. A common reference potential is defined as well as the electrical isolation against the system electronics. The temperature measuring range covers from -50 °C to 280 °C. The measurement is carried out in 2, 3, 4 conductor technology.

4 PT 100 inputs
2-,3-,4-conductor measurement
Approvals: CE, Railway norm EN 50155
In preparation UL, CSA, GL

Dimensions (mm): H x W x D
22,5 x 99,5 x 114,5

Description		Type	Part No.	Box Qty	Type	Part No.	Box Qty
PT 100 Temperature measurement		TP 4AI PT 100	83.039.0150.0	1			
Display of operating modes							
Error LED (Greenbus):	red						
Power LED:	yellow						
System data							
Number of inputs		4 Temperature inputs PT 100					
Number of outputs		–					
Operating voltage		5/3,3 V DC via 24 V DC power supply (83.039.0100.0)					
Power consumption		100/120 mA					
Parameter settings via rotary switch		Greenbus address					
Technical data							
Inputs		2-, 3-, 4-conductor technology					
Temperature measurement		-50 °C.....+280 °C					
Conversion time		2 ms					
Resistance measurement		87 Ohm – 133 Ohm					
Overvoltage protection		+/- 36 V					
Resolution		12 Bit					
Accuracy (inout/output)		0,4% (optional 0,2%)					
Temperature drift		maximum 40 ppm / K					
Common-mode rejection		> 60 dB					
Common-mode rejection		> 60 dB					
Linearisation		Via user program, toggles between resistance or					
		temperature linearisation					
Equipotential isolation		Channels isolated against the electronics, common reference potential					
Insulation voltage		350 V AC, 50 Hz (system/supply)					
Basic norms		EN 50155, EN 50121-3-2					
Connection technology		Plug-in connections in screw or spring-loaded technology					
Wire range for finely stranded/single core		0,14 mm^2 – 1,5 mm^2 / 0,5 mm^2 – 2,5 mm^2					
Ambient temperature		EN 50155 Tx -40 °C / +70 °C (+85 °C, 10 min)					
Storage temperature		-40 °C / +85 °C					
Protective varnish		Peters SL 1309 in accordance with the railway norm					
Humidity		0 to 80%					
Connection coding		Coding pins					
Insertion and withdrawal in energised state		yes					
Accessories							
ricos TP mounting set			83.039.0190.0				
ricos TP connector, screw version			83.039.0190.1				
ricos TP connector, spring-loaded version			83.039.0190.2				

Subject to technical modifications

Special functions

ricos TP

The module offers 4 binary outputs with a nominal voltage of 24 V DC. A common reference potential is defined as well as the electrical isolation against the system electronics. Due to the implemented technology, the module can be used both statically and for issuing pulse-width-modulated signals. As the outputs are designed as potential-free, they can be switched in series and operated with positive or negative switching (current source and current sink).

4 Binary outputs static or PWM

Approvals: CE, Railway norm EN 50155
In preparation UL, CSA, GL

Dimensions (mm): H x W x D
22,5 x 99,5 x 114,5

Description		Type	Part No.	Box Qty	Type	Part No.	Box Qty
PWM output		TP 4DO PWM	83.039.0142.0	1			
Display of operating modes							
Error (Greenbus):	Red LED						
Power ok:	Yellow LED						
Channel status (high)	4 x Yellow LED						
System data							
Number of inputs		–					
Number of outputs		4 Binary outputs, 2-pole					
Operating voltage		3,3 V DC via 24 V DC power supply (83.039.0100.0)					
Power consumption		120 mA					
Parameter settings via rotary switch		Greenbus address					
Technical data							
Output voltage (EN 61131-3; Type 1)	max. 60 V DC						
Output current per module		max. 2 A DC					
Maximum total current per module		max. 8 A DC					
Output circuit		positive or negative switching					
Switching times		> 1 ms					
Output protection		thermal fuse					
Switching frequency		1 kHz					
Resolution PWM		10 bit					
Equipotential isolation		All channels isolated against each other and the electronics					
Insulation voltage		350 V AC, 50 Hz (system/supply)					
Basic norms		EN 50155, EN 50121-3-2					
Connection technology		Plug-in connections in screw or spring-loaded technology					
Wire range for finely stranded/single core		0,14 mm^2 – 1,5 mm^2 / 0,5 mm^2 – 2,5 mm^2					
Ambient temperature		EN 50155 Tx -40 °C / +70 °C (+85 °C, 10 min)					
Storage temperature		-40 °C / +85 °C					
Protective varnish		Peters SL 1309 in accordance with the railway norm					
Humidity		0 to 80%					
Connection coding		Coding pins					
Insertion and withdrawal in energised state		yes					
Accessories							
ricos TP mounting set			83.039.0190.0				
ricos TP connector, screw version			83.039.0190.1				
ricos TP connector, spring-loaded version			83.039.0190.2				

Subject to technical modifications