SIGMATEK

TSY 021

Training System
Basic Application

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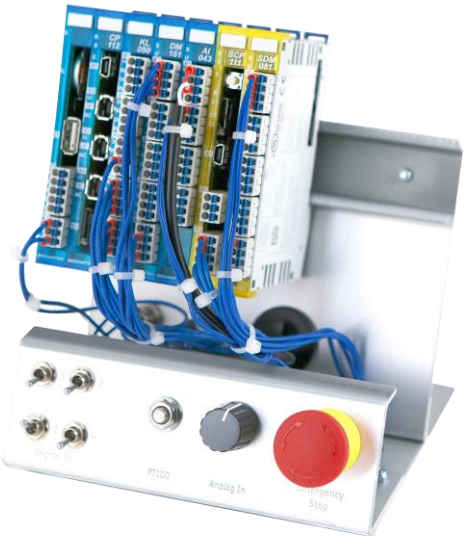
Training System Basic Application TSY 021



The TSY 021 training system is an application assembly that is used for training. The complete PLC consists of a S-DIAS CPU, several I/O modules and several control elements to simulate various input and output signals. The VARAN bus system serves for the data exchange between the TSY 021 and the extension module motion TSY 041 rest. The Ethernet 2 interface serves for the data exchange between the TSY 021 and the HMI extension module TSY 031.
The power for the assembly is supplied over a connection to mains voltage.

Additionally, a RJ45 network cable for establishing an online connection is part of the application.

The following system components are integrated and fixly wired in the TSY 021:

1x Desktop Power Supply with Three-pin Plug (cable length: 2.5 m)
1x S-DIAS CPU Module CP 112-2
1x S-DIAS Power Supply Module KL 090
1x S-DIAS Digital Mixed Module DM 161
1x S-DIAS Analog Input Module AI 043
1x S-DIAS Safety CPU Module SCP 111
1x S-DIAS Safety Digital Mixed Module SDM 081
1x RJ45 to Tyco Mini I/O cable 1 m
4x Toggle Switches (for the simulation of digital inputs)
1x Potentiometer (for simulating analog inputs) range: 0-10 V
1x PT100 (for the simulation of an analog input)
1x Emergency-Stop Switch (for simulation of a protection unit)
1x USB stick (with documentation)

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1 Technical Data

1.1 Performance Data

Processor	EDGE2 Technology
Addressable I/O/P modules	VARAN Bus: 65,280 CAN participants: > 100 S-DIAS bus: 64
Internal I/O	no
Internal cache	512-kbyte L2 Cache
Internal program and data memory (DDR3 RAM)	256-Mbyte
Internal remnant data memory	256-kbyte SRAM (battery buffered)
Internal storage device	4 GByte microSD (3dpSLC technology) [1)]
Interfaces	1x USB host 2.0 (high speed 480 Mbits/s) 1x USB device 1.1 2x Ethernet 1x VARAN Out (Manager) (maximum cable length: 100 m) 1x CAN 1x S-DIAS (with manager)
Status display	no
Status LEDs	yes
Real-time clock	yes (battery buffered)

1) The 4 GByte microSD card is formatted to 1 GByte in order to achieve the lifetime of a standard SLC card. A format change to the full 4 GByte is not allowed and will result in a massive reduction of the microSD card's lifetime.

The CAN bus is configured (station number, baud rate) via the microSD card or programming interface (USB device).

1.2 Standard Configuration

Ethernet 1	X4	IP 1,000,000	Subnet mask: 1,000,000
Ethernet 2	X3	Ethernet 2 is not configured by default	

Problems can arise if a control is connected to an IP network, which contains modules that do not run on a SIGMATEK operating system. With such devices, Ethernet packets could be sent to the control with such a high frequency (i.e. broadcasts), that the high interrupt load could cause a real-time runtime error or runtime error. By configuring the packet filter (Firewall or Router) accordingly however, it is possible to connect a network with SIGMATEK hardware to a third party network without triggering the error mentioned above.

1.3 Electrical Requirements

1.3.1 Module Supply (Input)

Supply voltage	+5 V

1.3.2 S-DIAS Bus Supply (Output)

Voltage supply on the S-DIAS bus	+5 V	
Current consumption on the S-DIAS bus (+5 V supply)	typically 400 mA(1)	maximum 450 mA(1)

(1) The current consumption is dependent on the connected loads.

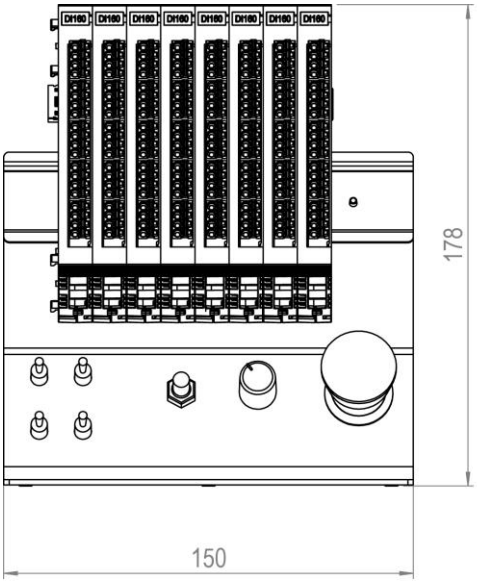
1.4 Miscellaneous

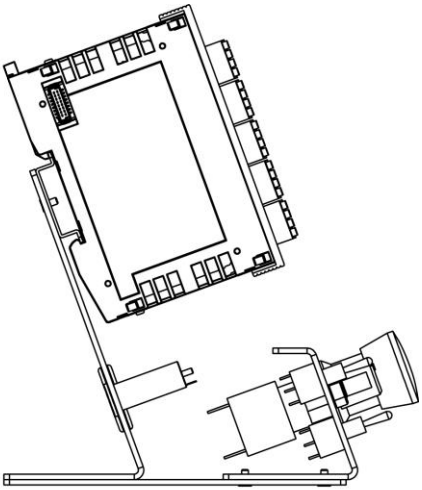
Article number	12-100-021
Project backup	internally on the microSD card

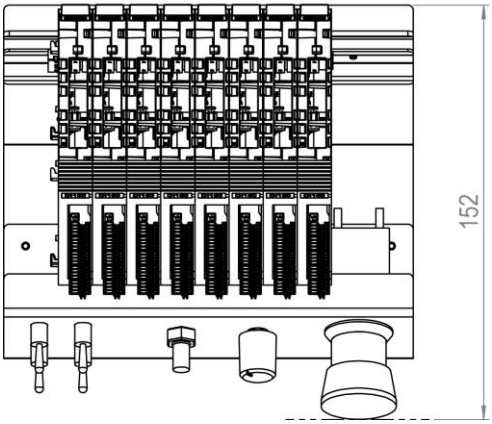
1.5 Environmental Conditions

Storage temperature	-20 ... +85 °C	
Environmental temperature	0 ... +55 °C	
Humidity	0-95 %, non-condensing	
EMC resistance	in accordance with EN 61000-6-2 (industrial area)	
EMC noise generation	in accordance with EN 61000-6-4 (industrial area)	
Vibration resistance	EN 60068-2-6	3.5 mm from 5-8.4 Hz 1 g from 8.4-150 Hz
Shock resistance	EN 60068-2-27	15 g
Protection type	EN 60529	IP20

2 Mechanical Dimensions

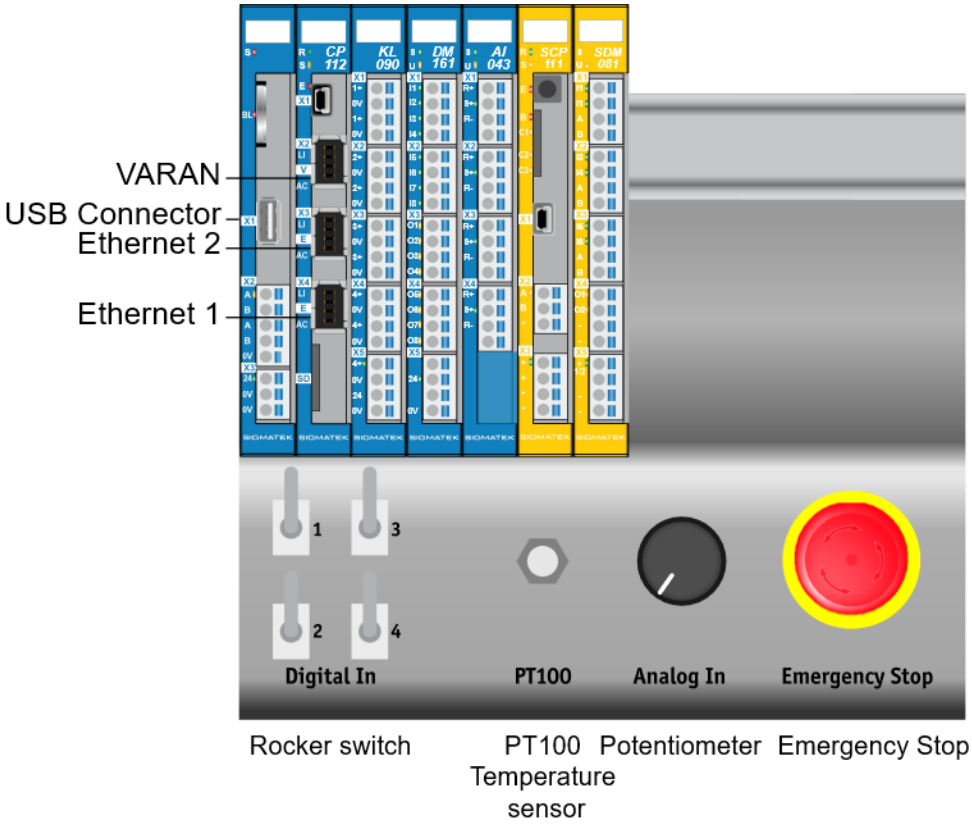




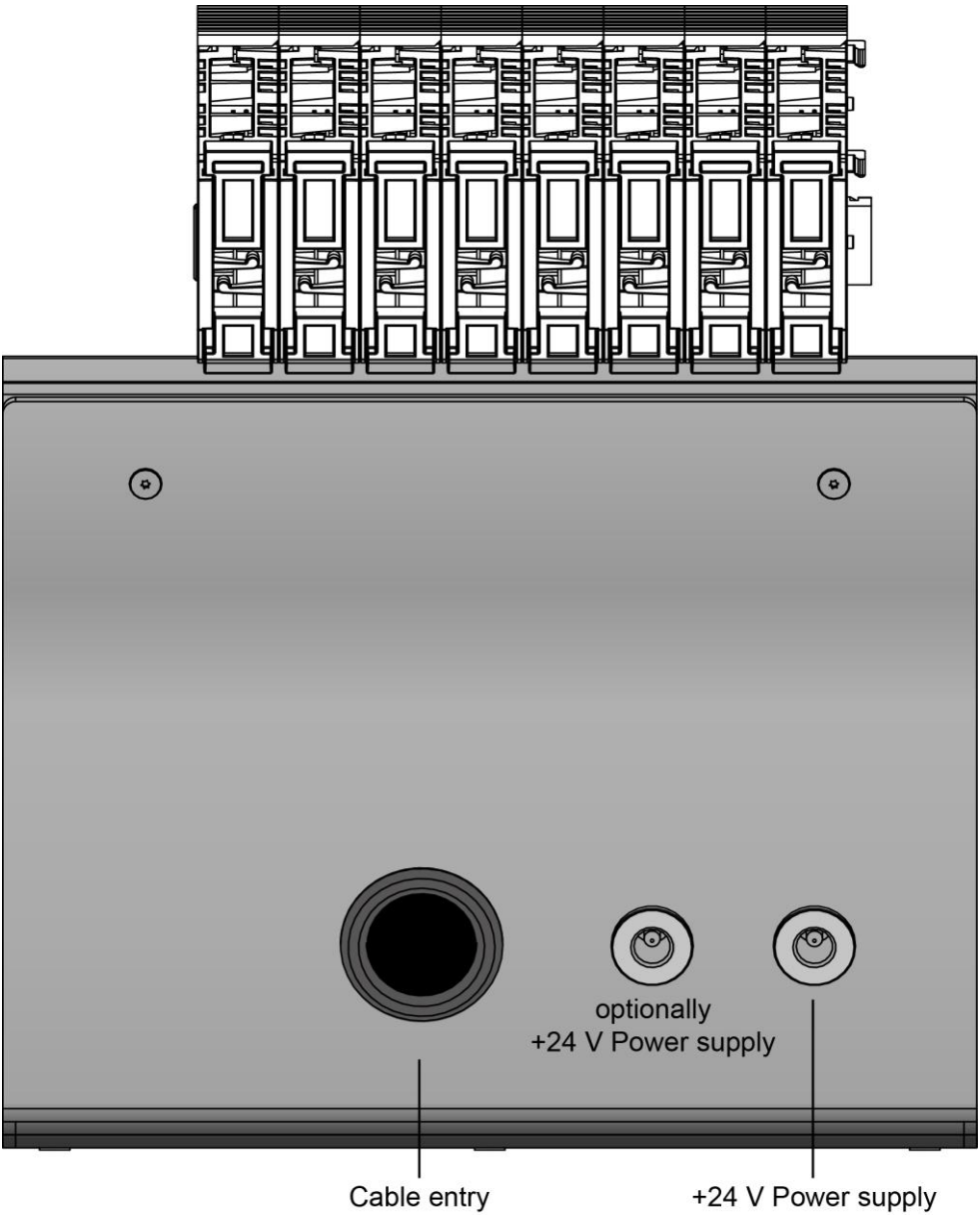


3 System Construction - Control Elements

3.1 Front View



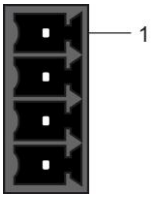
3.2 Back View



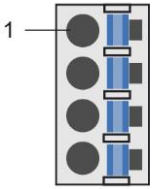
4 Connector Layout

4.1 S-DIAS Digital Mixed Module DM 161 (Digital Inputs Toggle Switches 1-4)

X1: Connector Input 1-4

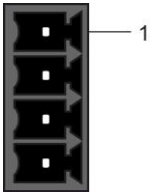


Pin	Assignment
1	Digital input (toggle switch 1)
2	Digital input (toggle switch 2)
3	Digital input (toggle switch 3)
4	Digital input (toggle switch 4)

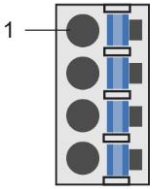


4.2 S-DIAS Analog Input Module AI 043 (Analog inputs PT100 and Potentiometer)

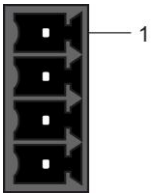
X1: Connector PT100 Temperature Sensor



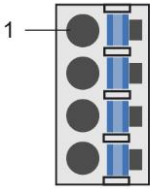
Pin	Assignment
1	Temperature sensor +
2	not used
3	Temperature sensor -
4	not used



X2: Connector Potentiometer

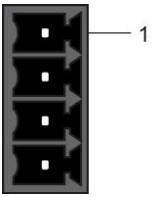


Pin	Assignment
1	Potentiometer sliding contact +
2	not used
3	Potentiometer -
4	not used

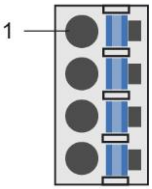


4.3 S-DIAS Safety Mixed Module SDM 081 (Digital Inputs 1 and 2 for two-channel connection emergency-stop switch)

X1: Connector Emergency-Stop Switch



Pin	Assignment
1	Emergency-stop switch channel A
2	Emergency-stop switch channel B
3	Cycle A
4	Cycle B



Documentation Changes

Change date	Affected page(s)	Chapter	Note
19.09.2022	4	1.1 Performance Data	Internal storage device changed
02.11.2026	2	Training System Basic Application TSY 021	CP replaced