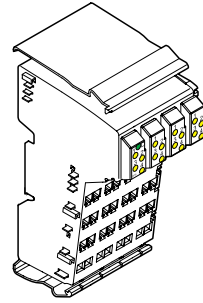


# VARIO DI 16/24



## I/O Extension Module With 16 Digital Inputs



5553A001

User Manual

02/2003



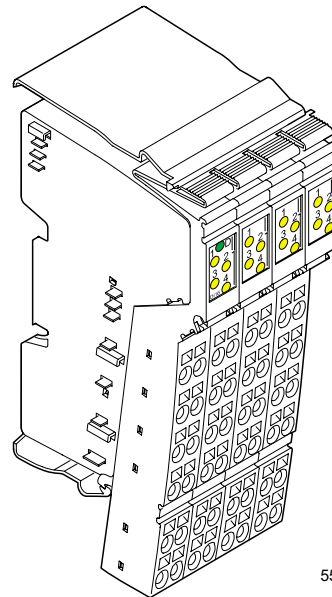
This data sheet is only valid in association with the documents of the used fieldbus coupler

## Function

This terminal is used to accept 24 V digital input signals from sourcing devices. It is designed for use within an VARIO station.

## Features

- Connections for 16 digital sensors
- Connection of 2- and 3-wire sensors
- Maximum permissible load current per sensor: 250 mA
- Maximum permissible load current from the terminal: 4.0 A
- Diagnostic and status indicators



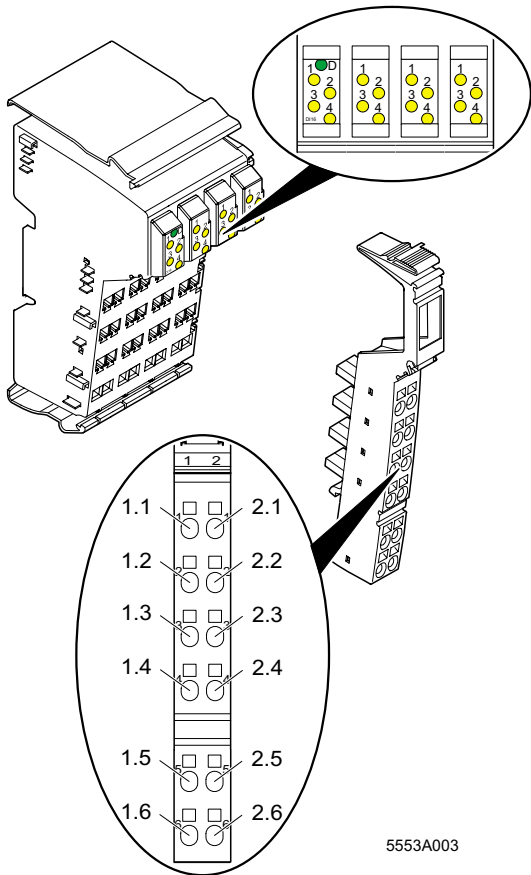
5553A002

Figure 1

VARIO DI 16/24 terminal with the connectors plugged in



All modules will be delivered including connectors and labeling fields.



5553A003

Figure 2 VARIO DI 16/24 terminal with an appropriate connector

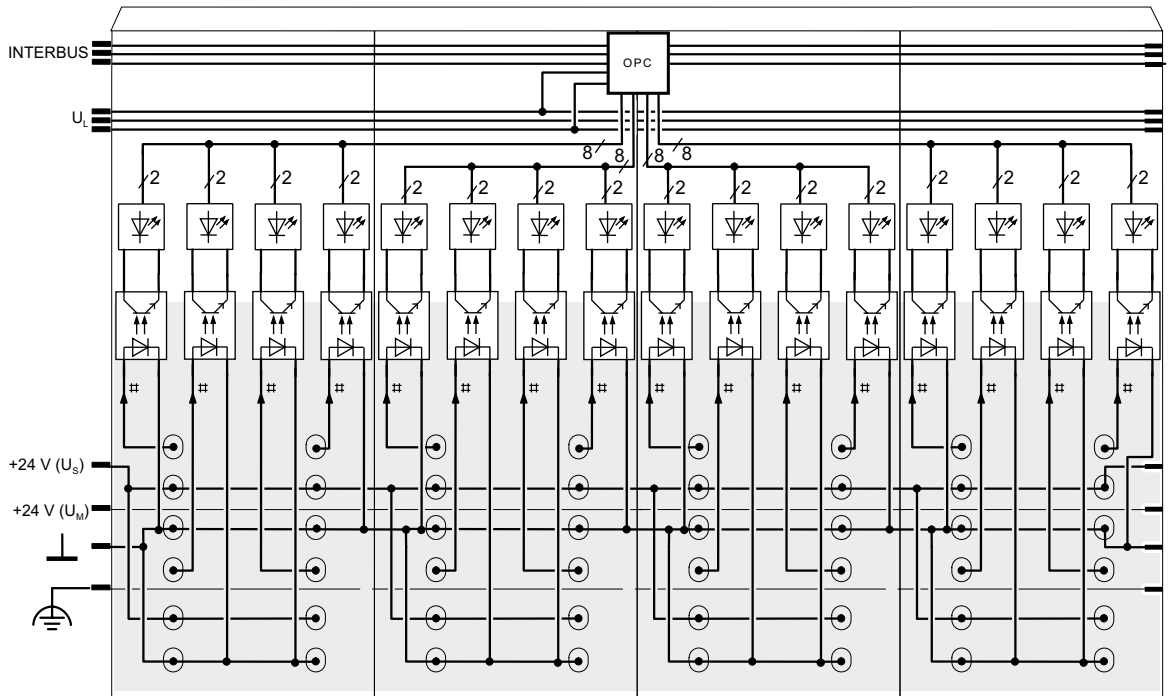
### Local Diagnostic and Status Indicators

Des.	Color	Meaning
D	Green	Bus diagnostics
<b>Each connector</b>		
1, 2, 3, 4	Yellow	Status indication of the inputs

### Terminal Assignment for Each Connector

Terminal Point	Assignment
1.1, 2.1	Signal input (IN)
1.2, 2.2	Segment voltage $U_S$ for 2- and 3-wire termination
1.3, 2.3	Ground contact (GND) for 3-wire termination
1.4, 2.4	Signal input (IN)
1.5, 2.5	Segment voltage $U_S$ for 2- and 3-wire termination
1.6, 2.6	Ground contact (GND) for 3-wire termination






# Internal Circuit Diagram



55523003

Figure 3 Internal wiring of the terminal points

Key:

-  INTERBUS protocol chip  
(bus logic including voltage conditioning)
-  LED (status indicators)
-  Optocoupler
-  Digital input
-  Isolated area

## Connection Example



When connecting the sensors, observe the assignment of the terminal points to the fieldbus reference (see page 5).

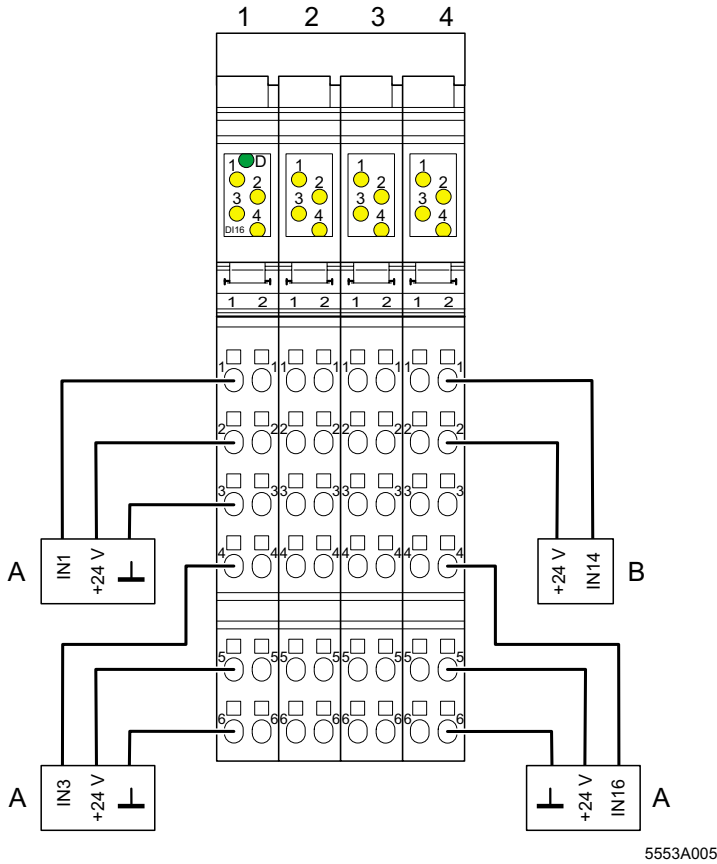


Figure 4 Typical sensor connections

A 3-wire termination

B 2-wire termination

The numbers shown above the terminal indicate the mounting locations of the connectors.

## Programming Data

ID code	BE <sub>hex</sub> (190 <sub>dec</sub> )
Length code	01 <sub>hex</sub>
Input address area	2 bytes
Output address area	0 bytes
Parameter channel (PCP)	0 bytes
Register length (bus)	2 bytes

## Process Data Words



### Assignment of the Terminal Points to the Process Data Input Word

(Word.bit) view	Word	Word 0															
	Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
(Byte.bit) view	Byte	Byte 0								Byte 1							
	Bit	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Module	Slot	4				3				2				1			
	Terminal point (signal)	2.4	1.4	2.1	1.1	2.4	1.4	2.1	1.1	2.4	1.4	2.1	1.1	2.4	1.4	2.1	1.1
	Terminal point (+24 V)	2.5	1.5	2.2	1.2	2.5	1.5	2.2	1.2	2.5	1.5	2.2	1.2	2.5	1.5	2.2	1.2
	Terminal point (GND)	2.6	1.6	2.3	1.3	2.6	1.6	2.3	1.3	2.6	1.6	2.3	1.3	2.6	1.6	2.3	1.3
Status indication	Slot	4				3				2				1			
	LED	4	3	2	1	4	3	2	1	4	3	2	1	4	3	2	1



The process data output word is not used.

## Technical Data

General	
Housing dimensions (width x height x depth)	48.8 mm x 120 mm x 71.5 mm (1.921 in. x 4.724 in. x 2.815 in.)
Weight	122 g (without connectors)
Operating mode	Process data operation with 2 bytes
Connection type of the sensors	2- and 3-wire technology
Permissible temperature (operation)	-25°C to +55°C (-13°F to +131°F)
Permissible temperature (storage/transport)	-25°C to +85°C (-13°F to +185°F)
Permissible humidity (operation)	75% on average, 85% occasionally
 Ranging from -25°C to +55°C (-13°F to +131°F) appropriate measures against increased humidity (> 85%) must be taken.	
Permissible humidity (storage/transport)	75% on average, 85% occasionally
 For a short period, slight condensation may appear on the housing if, for example, the terminal is brought into a closed room from a vehicle.	
Permissible air pressure (operation)	80 kPa to 106 kPa (up to 2000 m [6562 ft.] above sea level)
Permissible air pressure (storage/transport)	70 kPa to 106 kPa (up to 3000 m [9843 ft.] above sea level)
Degree of protection	IP 20 according to IEC 60529
Class of protection	Class 3 according to VDE 0106, IEC 60536

Interface	
local bus interface	Through data routing

Power Consumption	
Communications power	7.5 V
Current consumption from the local bus	60 mA, maximum
Power consumption from the local bus	0.45 W, maximum
Segment supply voltage $U_S$	24 V DC (nominal value)
Nominal current consumption of $U_S$	4 A, maximum

**Supply of the Module Electronics and I/O Through Bus Terminal/Power Terminal**

Connection method	Through potential routing
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**Digital Inputs**

Number	16
Input design	According to EN 61131-2 Type 1
Definition of switching thresholds	
Maximum low level voltage	$U_{Lmax} < 5 \text{ V}$
Minimum high level voltage	$U_{Hmin} > 15 \text{ V}$
Common potentials	Segment supply, ground
Nominal input voltage $U_{IN}$	24 V DC
Permissible range	$-30 \text{ V} < U_{IN} < +30 \text{ V DC}$
Nominal input current $U_{IN}$	3 mA, minimum
Delay time	None
Permissible cable length to the sensor	30 m (98.4 ft.) (to ensure conformance with EMC directive 89/336/EEC)
Use of AC sensors	AC sensors in the voltage range $< U_{IN}$ are limited in application. (corresponding to the input design)

**Characteristic Curve: Current Depending on the Input Voltage and the Ambient Temperature  $T_U$** 

Supply voltage	Input current	Input current after $t \geq 20 \text{ s}$	
		At $T_U = 25^\circ\text{C} (77^\circ\text{F})$	At $T_U = 55^\circ\text{C} (131^\circ\text{F})$
18 V	3.0 mA	2.9 mA	2.5 mA
24 V	3.9 mA	3.8 mA	3.5 mA
30 V	4.5 mA	4.2 mA	3.0 mA


The current is reduced depending on the ambient temperature  $T_U$  and the number of inputs that are switched on (internal terminal temperature).

<b>Power Dissipation</b>	
<b>Formula to calculate the power dissipation of the electronics</b>	
$P_{\text{tot}} = 0.525 \text{ W} + \sum_{n=0}^{16} [ U_{\text{INn}} \times 0.003 \text{ A} ]$	
With	
$P_{\text{tot}}$	Total power dissipation of the terminal
$n$	Index of the number of set inputs $n = 0$ to $16$
$U_{\text{INn}}$	Input voltage of the input $n$
<b>Power dissipation of the housing <math>P_{\text{HOU}}</math></b>	2.8 W, maximum (within the permissible operating temperature)

<b>Concurrent Channel Derating</b>	
Derating	No limitation of the channel simultaneity. All outputs can be on at maximum current without exceeding housing maximum power dissipation.

<b>Safety Devices</b>	
Overload in segment circuit	No
Surge voltage	Protective circuits of the power terminal
Polarity reversal	Protective circuits of the power terminal



Electrical Isolation	
	To provide electrical isolation between the logic level and the I/O area, it is necessary to supply the bus terminal and this digital input terminal from separate power supply units. Interconnection of the 24 V power supplies is not allowed! (For detailed information refer to the user manual.)
Common potentials	
24 V I/O voltage, 24 V segment voltage, and GND have the same potential. FE (functional earth ground) is a separate potential area.	
Separate system potentials consisting of bus terminal/power terminal and I/O terminal	
- Test distance	- Test voltage
5 V supply incoming remote bus / 7.5 V supply (bus logic)	500 V AC, 50 Hz, 1 min.
5 V supply outgoing remote bus / 7.5 V supply (bus logic)	500 V AC, 50 Hz, 1 min.
7.5 V supply (bus logic) / 24 V supply (I/O)	500 V AC, 50 Hz, 1 min.
24 V supply (I/O) / functional earth ground	500 V AC, 50 Hz, 1 min.
Error Messages to the Higher-Level Control or Computer System	
None	

## Ordering Data

Description	Order Designation	Order No.
Terminal with 16 digital inputs with connectors and labeling fields	VARIO DI 16/24	KSVC-102-00151



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