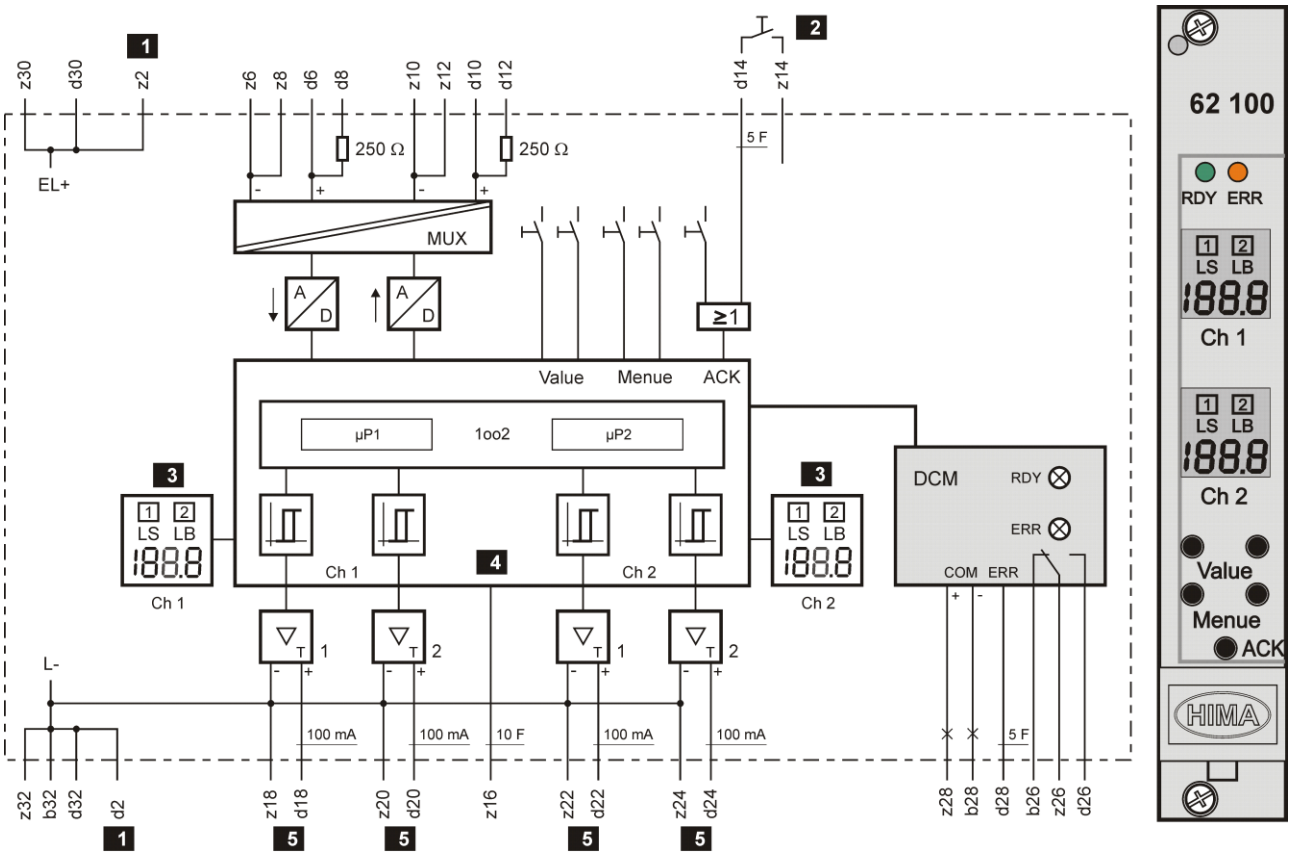
62 100: Analog Limit Indicator

- **Safety-related**
- 2 channels

Input 0…22 mA / 0…5.5 V without line diagnosis
or 4…22 mA / 1…5.5 V with line diagnosis
100 mA with configurable line diagnosis every 2 outputs

The module can be used for the following applications:

- With 1oo1 wiring in accordance with IEC 61508 for SIL 3 applications
- With redundant wiring (1oo2 or 2oo3), for SIL 4 applications



Z6 + z10 must be connected to L-

1 Connection of z2, d2, z4, d4 is not required

2 Maximum cable length to external ACK key: ≤ 3 m. The cable may only be led within the control cabinet!

3 Ch1 display, Ch2 display

4 Alarm

5 Outputs: short-circuit-proof. Maximum cable length: ≤ 10 m

Figure 1: Block Diagram

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English translation of the German original document: HI 804 024 D, 62 100 (1610)

Analog Element

Input voltage	0...5.5 V
Input current	0...22 mA (250 Ω shunt)
Measuring range	In accordance with NE43 (I > 3.6 mA, I < 21 mA)
Input resistance	≥ 100 kΩ
Intrinsic error limit	≤ 0.25 % of full scale (+25 °C)
Operating error limit	≤ 0.4 % of full scale at -25...+70 °C
Resolution	12-bit (full scale including overflow)
Filter constant	10 ms

Digital Element

Switching time	< 250 ms
Output:	
▪ Current limiting	110 mA ± 10 %
▪ Internal voltage drop	2.5 V at maximum load
▪ Minimum load	12 kΩ (no lamp load)
▪ Maximum inductance	1 H
Safety time	250 ms
Operating data	24 VDC / 170 mA plus load
Space requirement	3 RU, 4 HP

The 62 100 safety-related limit indicator for analog circuits is a 4 HP wide module that is designed for 19-inch subracks (3 RU) and is equipped with a dual processor system. It includes two voltage inputs (0...5.5 V) that are galvanically separated from the outputs. The limit value outputs are activated when the limit and hysteresis values are achieved. If the input voltage is no longer within the permissible normal range, this is reported either via the common alarm signal output or through a fault signal and subsequent module shutdown.

If safety-related transmitters are used, two limit values can be defined for each two independent analog circuits. If redundantly operating transmitters are used, one limit value can be defined for each of the four module outputs. Since safety-related transmitters for SIL 3 are not very common, two transmitters are used at the same measuring point. Their analog values are compared to differences in the preset values and time. The value difference overrun is indicated at the common alarm signal output.

The rate of change (the gradient) of the analog value can also be recorded via an configurable time base and can be assigned to limit values..

The short-circuit-proof outputs can be preset with the following parameters: limit value or gradient, hysteresis, switching direction and, optionally, line diagnosis (monitoring of the output circuit for short-circuits and open-circuits). The outputs of safety-related limit indicator modules can be connected in parallel to increase availability.

The digitized analog values of both channels are displayed to the LCD on the front side as percentages with a resolution of 0.1 %. The 1-signal of the outputs is indicated by an illuminated frame around the corresponding icons. An open-circuit or short-circuit in the output circuits is reported via blinking icons.

Five keys and LCDs located on the front side are used to set up the module. No additional device or PC with a special program is required.

For safety reasons, the defined parameters cannot be changed during operation. During operation, however, the defined parameters can be selected and displayed using the keys located on the front side.

As a mono system, the module can also be operated in a plastic housing without impairing its immunity to interference.

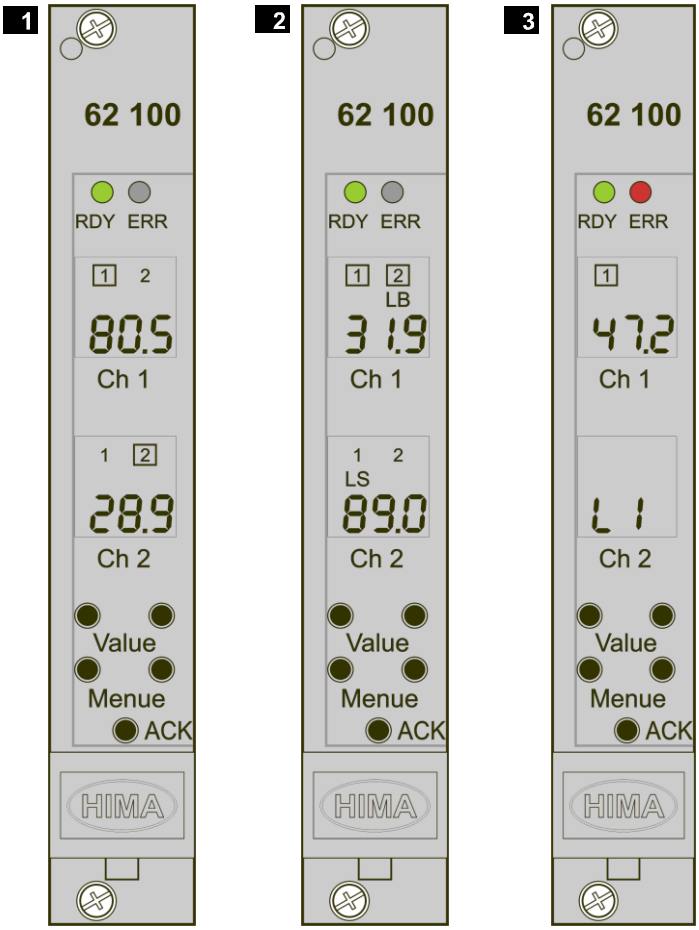
i Observe the safety notices and operating conditions specified in this data sheet as well as the notices in the Planar4 safety and system manual (HI 804 003 E).

If a malfunction occurs, the *ERR* LED is lit, output d28 is on 1-signal and relay contact z26-d26 opens.

Output z28-b28 is intended for connecting to the communication module, e.g., for transferring data to a distributed control system (DCS).

RDY (Ready) indicates the applied operating voltage (≥ 20 V).

Examples of Indicators



1 Mode of operation RUN, the current output values are displayed

2 Mode of operation RUN, the current output values are displayed, open-circuit and short-circuit, the number of the faulty channel is blinking

3 Mode of operation PROG (programming), the ERR LED is blinking, Limit value of channel 1, output 1 is displayed

Figure 2: Examples of Displays

Parameters	Range of values	Resolution
Limit value 0…20 mA / 0…5 V 4…20 mA / 1…5 V	 0.0...110.0 % [1)] 0.0...112.5 % [1)]	 0.1 % 0.1 %
Hysteresis Default value 0.5 %	0.5/1...100 %	1 %
[1)] with max. 22 mA / 5.5 V		

Table 1: Limit Value and Hysteresis Settings

Switching off the Outputs upon Violation of the Normal Range (NE43)

The *Input Signal* parameter is used to configure the switching off of the outputs when the input signals are outside the normal range. To this end, *Input Signal* must be set to 4. If the analog input signal is outside the normal range < 3.6 mA / 0.9 V or > 21 mA / 5.25 V in accordance with NAMUR recommendation NE43, output d28 (ERR) is set to TRUE. The ERR LED is lit and all limit value outputs are switched off.

In mode of operation 40 (4...20 mA / 1...5 V without ERR), the output z16 (Alarm) is TRUE if the input values are less than 3.6 mA/1 V.

Switching Direction L (Low)

The limit value output is switched off if the defined limit value is underrun, and is switched on again if the limit value plus the hysteresis value is overrun.

Switching Direction H (High)

The limit value output is switched off if the defined limit value is overrun, and is switched on again if the limit value minus the hysteresis value is underrun.

Line Diagnosis of the Limit Value Outputs

Optional: Display if faults are present

Outputs are safety-related. If they are used to switch the inputs of safety-related HIMA Planar4 modules, no line monitoring must be defined.

Non-Safety-Related Transmitters/Sensors in Safety-Related Applications

The limit indicator module supports the parallel operation of two non-safety-related transmitters/sensors in 2oo2 wiring (AND) for safety-related applications up to SIL 3. To this end, a limit value can be set and the discrepancies for values and time can additionally be predefined for each of the four module outputs.

The minimum, mean or maximum value of the two sensors can be used as limit value.

Parameters	Range of values	Resolution
Limit value	0...100.0 %	0.1 %
Hysteresis Default value 0.5 %	0.5/1...100 %	1 %
Value discrepancy	1.0...90.0 %	0.5 %
Time discrepancy	0.1...199.9 s 1...1999 s	0.1 s 1 s

Table 2: Settings for Operating Non-Safety-Related Sensors in Parallel

If the value discrepancy is overrun, the z16 output (Alarm) is on 1-signal during the time discrepancy and, upon expiration of this time period, all related limit value outputs are switched off.

Recording the Rate of Change

Any change of the analog input signal is recorded over a configurable time period. If the defined rate of change is overrun, the affected limit value outputs are switched on.

Positive (ascending), negative (descending) and absolute (ascending or descending) gradients can be selected during parameter setting.

Parameters	Range of values	Resolution
Change in value 0…20 mA / 0…5 V 4…20 mA / 1…5 V	 0.5...110.0 % [1)] 0.5...112.5 % [1)]	 0.5 % 0.5 %
Time range (the value displayed is rounded)	0.3; 0.5; 0.8; 1.0; 1.3; 1.5; ... 10 s	approx. 0.25 s
[1)] with max. 22 mA / 5.5 V		

Table 3: Setting for Rate of Change Recording

The entire time range of all configured gradients may not exceed 20 s.

If the rate of change can no longer be recorded (e.g., due to range overrun), output z16 (Alarm) is on 1-signal.

Unused Functions

- Unused channels can be switched off during parameter setting.
- Unused limit value outputs configured for line monitoring must be loaded with at least 12 kΩ load.

Displays During Operation

Mode of Operation	7 segments 0...109.9 %	LED RDY	LED ERR	Icon 1, 2	Frame for icon 1, 2	LB display	LS display	Relay
L signal on 1, 2	Value	ON	OFF	ON	OFF	OFF	OFF	ON
H signal at 1, 2	Value	ON	OFF	ON	ON	OFF	OFF	ON
I_E < 3.6 mA (0.9 V) [1)]	Value	ON	OFF [2)] ON	ON	OFF	ON	OFF	ON [2)] OFF
I_E > 21 mA (5.25 V) [1)]	Value	ON	OFF [2)] ON	ON	OFF	OFF	ON	ON [2)] OFF
LB	Value	ON	ON	Blinking	OFF	ON	OFF	OFF
LS	Value	ON	ON	Blinking	OFF	OFF	ON	OFF
Internal fault	ERR	OFF	ON	OFF	OFF	OFF	OFF	OFF
Analog fault	ERR	OFF	ON	OFF	OFF	OFF	OFF	OFF
Digital fault	Value	OFF	ON	Blinking	OFF	OFF	OFF	OFF
Program	Value	ON	Blinking	ON/OFF	ON/OFF	OFF	OFF	OFF
	[1)] In accordance with NAMUR NE43, operating with 4...20 mA [2)] Depending on the parameter setting							

Table 4: Displays During Operation

Display Value:
Range of values: 0...22 mA / 0...5.5 V: 0...110 %
Range of values: 4...22 mA / 1...5.5 V: 0...112.5 %
In the mode of operation Gradient Monitoring, the current input value is displayed instead of the gradient.

Parameter Displayed During Operation

Displays	Description
- - -	Channel not operating
<0.0	Analog input value < 4.0 mA / 1.0 V (at 4…20 mA / 1…5 V)
Err 100	Error code 100: internal analog module fault
Err 101	Error code 101: both channels with open-circuit or short-circuit
Err 110	Error code 110: value difference in 2oo2 wiring too high
Err 131	Error code 131: configured data is invalid
	Other error codes are not relevant for the user

Table 5: Parameter Displayed during Operation

The parameters are selected using the left or right *Menu* key. The display mode is exited in the following cases:

- Once all the value were displayed.
- After using the right *Menu* key.
- If the left *Menu* key is used while the first display mode is active.
- If no key is used for 10 s.

Fault Relay Contact Data

Contact material	Ag alloy, gold plated
Switching voltage	≤ 30 VDC / VAC, ≥ 10 mV
Switching current	≤ 1 A, ≥ 10 µA
Switching capacity DC	≤ 30 W, induction-free load
Switching capacity AC	≤ 30 VA, cos φ > 0.7
Bounce time	< 2 ms
Lifetime	
mechanical	> 10^7 switching operations
electrical	> 10^5 switching operations at ohmic load and ≤ 0.1 switching operations/s

Controlling the Modules of the HIMA Planar4 System

If the limit value outputs are connected to inputs of safety-related modules of the HIMA Planar4 system, the de-energized to trip principle must be applied (0-signal when the limit value is achieved) and no line monitoring must be defined for the limit value outputs.

Safety Notices and Operating Requirements

Outputs z16 (Alarm) and d28 (ERR) and the fault relay contact must not be used for safety-related functions.

During safety-related operation, the analog inputs of the 62 100 limit indicator module may only be connected to the following signal sources:

- Two signal sources that are galvanically separated from one another or
- Signal source with a common, negative reference potential

  Safety-related operation with signal sources that are galvanically connected and have different reference potential per channel is not permitted.

The field lines of the input current circuits must be led with shielded cables; HIMA recommends using twisted pair wires. The shield must be placed on both sides.

If it is sure that the environment of the transmitter up to the limit indicator module is free from interferences and the distance is rather short (e.g., within a control cabinet), shielded cables or twisted pairs of wires are no longer necessary.

The analog inputs, however, can only ensure immunity to interference if shielded cables are used.

Recommendations for Using the Limit Indicator Module

In accordance with IEC 61508, SIL 3 and SIL 4

- Power supply lines must be physically separated from the input and output current circuits.
- The output current circuits must be connected with two poles.
- Measures against power loss, voltage variations and undervoltage must be taken in the 24 VDC system power supply.
- The switching direction in dangerous situations must be defined prior to start up and must be in compliance with the physical value alteration.
- Measures against temperature overrun must be taken outside the limit indicator module, e.g., fans in the control cabinet.
- Events must be recorded in a logbook throughout the entire operation.

No specific maintenance is required for the limit indicator module. If a fault occurs, the limit value outputs and the fault relay are switched off, the ERR LED on the module's front side is lit and the d28 output is set to 1. For safety reasons, a faulty limit indicator module must be removed or replaced immediately.

Proof Test

The 62 100 module must be subject to a proof test in intervals of 10 years.

Notices

The display can only be read at ambient temperatures higher than -10 °C.

After switching on power during operation (mode of operation: RUN), all display parts are lit for approx. 40 s during the module's self-tests. In the mode of operation PROG (programming), the module is immediately ready to operate.

Setting the Parameters

The two channels can be set up if the mode switch on the PCB upper side is set to one of the two PROG end positions. To this end, remove the module from the subrack, set the mode switch to PROG (programming) and reinsert the module. The module is immediately ready for the first parameter setting step (see table on the following pages).

In PROG mode, all the outputs are switched off and the red ERR LED is blinking.

- The *Menu* and *Value* keys on the module's front side are used to select the parameters and enter the values. The existing or entered parameters are output to the displays. The right *Menu* key is used to display the parameters in the order specified in Table 6, the left *Menu* key is used to display them in reverse order. The two *Value* keys are used to set or change the desired parameters and values into both directions.
- **Important:** To acknowledge proper parameter setting, the same parameters must be entered again immediately in each step: Use the *Menu* key to enable the second entry. The values of the first entry are output to the upper display, the values of the second entry to the lower display. The *Menu* key can only be used to jump to the next or previous range if the entered value is within the permissible range and the first and second entries are identical.

After using the *ACK* key and if the entered values are valid, Oc is displayed for approx. 1 s and the new parameters are adopted. If the values are not matching, E01 or E02 is displayed and the values are not adopted. Use the *ACK* key once again to jump to the first parameter setting step.

Upon completion of the parameter setting, remove the limit indicator, set the PCB mode switch back to the center position (RUN) and reinsert the module into the subrack.

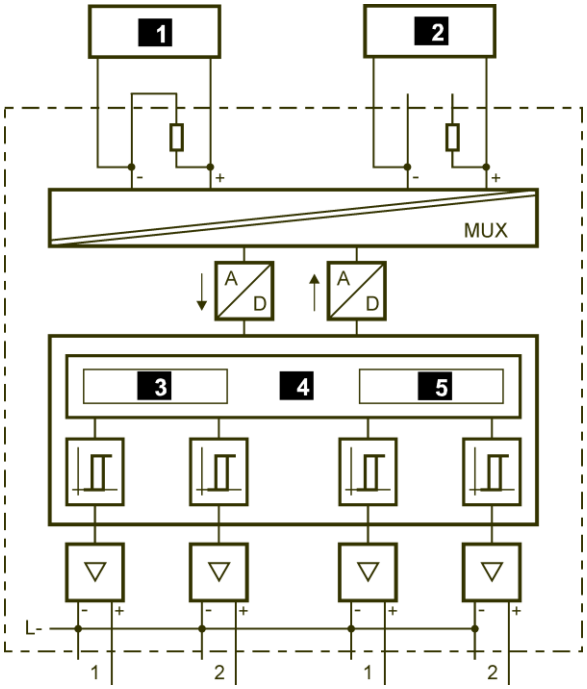
	Menu	Value	Description	Notes, explanations
1	Channel selection	cH 1	Channel 1 selected	Selection for parameter setting
		cH2	Channel 2 selected	
		rEd	2oo2 wiring	**After step 4, continue with 6**
2	Switching off channels not in use	On	Selected channel: ON	Additional displays: Mode of operation OP Channel number 1 or 2
		OFF	Selected channel: OFF	
3	Input	4	4...20 mA / 1...5 V with ERR	ERR: Outputs are switched off when input signals are outside the normal range (NE43)
		40	4...20 mA / 1...5 V without ERR	
		0	0…20 mA / 0…5 V	
4	Line diagnosis for outputs	OFF	Line diagnosis: OFF	Line diagnosis for limit value outputs
		On	Line diagnosis: ON	
5	Signal evaluation	L 1	Limit value **(continue with 5.1)**	Display: □ for output 1 (2)
		Gr	Gradient **(continue with 5.2)**	
5.1	Limit value	L 1	Selected: Limit value	Display: □ for output 1 (2)
5.1.1	Switching direction	L	Switching direction Low	Limit value underrun
		H	Switching direction High	Limit value overrun
5.1.2	Setting the limit value	188.8 188.8 188.8 188.8	Blinking digit display for value entry	Additional display: L 1 Digit selection via *Menu*, value setting via *Value*
5.1.3	Setting the hysteresis	188.8 188.8 188.8 188.8	Blinking digit display for value entry	Additional display: HS Digit selection via *Menu*, value setting via *Value*
5.1.4	Repeat steps as of 5 for the second output, **then continue with 7**			
5.2	Gradient	Gr	Selected: Gradient	Display: □ for output 1 (2)
5.2.1	Type	PG	Positive gradient	Rising values
		nG	Negative gradient	Falling values
		AG	Absolute gradient	Rising or falling values
5.2.2	Setting the value	188.8 188.8 188.8 188.8	Blinking digit display for value entry	Additional display: GdL Digit selection via *Menu*, value setting via *Value*

	Menu	Value	Description	Notes, explanations
5.2.3	Setting the time range	08.8 08.8 08.8	Blinking digit display for value entry	Additional display: 5dt Digit selection via *Menu*, value setting via *Value*
5.2.4	Repeat steps as of 5 for the second output, **then continue with 7**			
6	**Additional parameter setting for 2oo2 sensor wiring**			
6.1	Repeat step 5 to 5.1.3 or 5 to 5.2.3 for each of the 4 outputs, then:			
6.2	Evaluation of the sensors	A nA n1n	Mean value Maximum values Minimum values	
6.3	Setting the value discrepancy	188.8 188.8 188.8 188.8	Blinking digit display for value entry	Additional display: dL Digit selection via *Menu*, value setting via *Value*
6.4	Selection of time base	dS S	Deciseconds (0.1 s) Seconds	Additional display: dtS
6.5	Setting the time discrepancy	188.8	Blinking digit display for value entry, see above	Additional display: dt
7		Acc	Press the *ACK* key	Additional display: cH1 or cH2 or rEd
7.1	*ACK* key	Acc	Stored entries, display: Oc	(for approx. 1 s)
7.2	*ACK* key	Acc	Non-stored entries, display: E01 or E02 E01: Limit value + hysteresis > permissible range of values E02: Limit value - hysteresis < permissible range of values Entry correction after using ACK	

Table 6: Parameter Setting Order

Operation with Safety-Related Transmitters

In this application, the first channel is operated with current input of 4...20 mA, the second channel with voltage input of 0...5 V.



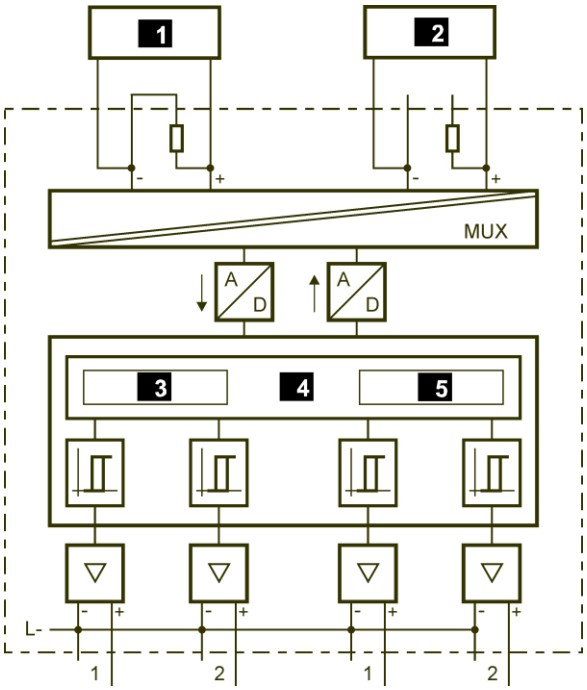
1 Transmitter 4…20 mA
2 Transmitter 0…5 V
3 Processing unit 1
4 1oo2 system
5 Processing unit 2

Figure 3: Operation with Safety-Related Transmitters

2oo2 Wiring of Sensors with Discrepancy Monitoring

Since safety-related transmitters are not very common, two standard sensors must be used at the same measuring point to ensure safety. In this case, both sensors operate on the same outputs. The permissible value and time discrepancies are preset. If the minimum, mean or maximum value of the two transmitters is overrun or underrun, the associated output is switched off. Four limit values can be created.

This application can also be used to compare the two analog values for a permissible deviation.

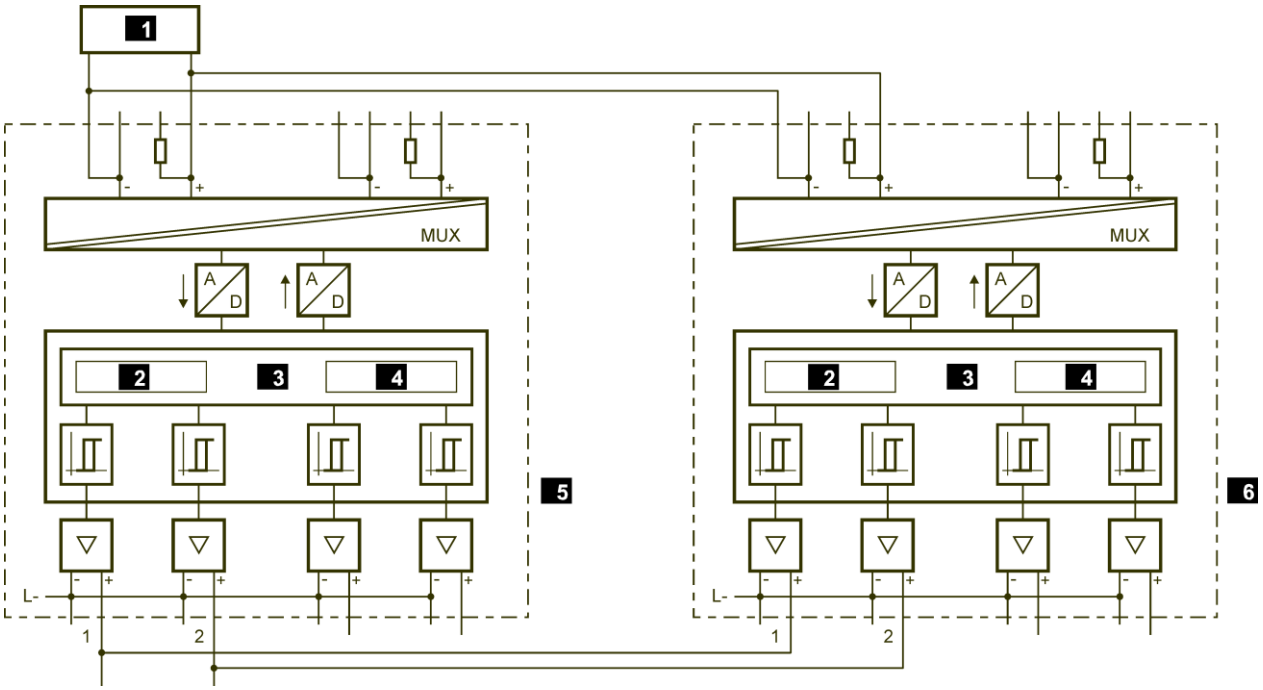


1 Transmitter 0/4…20 mA
2 Transmitter 0/4…20 mA
3 Processing unit 1
4 1oo2 system
5 Processing unit 2

Figure 4: 2oo2 Sensor Wiring with Discrepancy Monitoring

Redundancy Operation, Voltage Input 0...5 V

The output voltage of a transmitter is connected in parallel to two independent 62 100 limit indicator modules. Both modules are set to the same limit value and their outputs are connected in parallel. Failure of one limit indicator module does not affect the signal of the downstream logic circuit. In this mode of operation, no line diagnosis of the output circuits is possible.

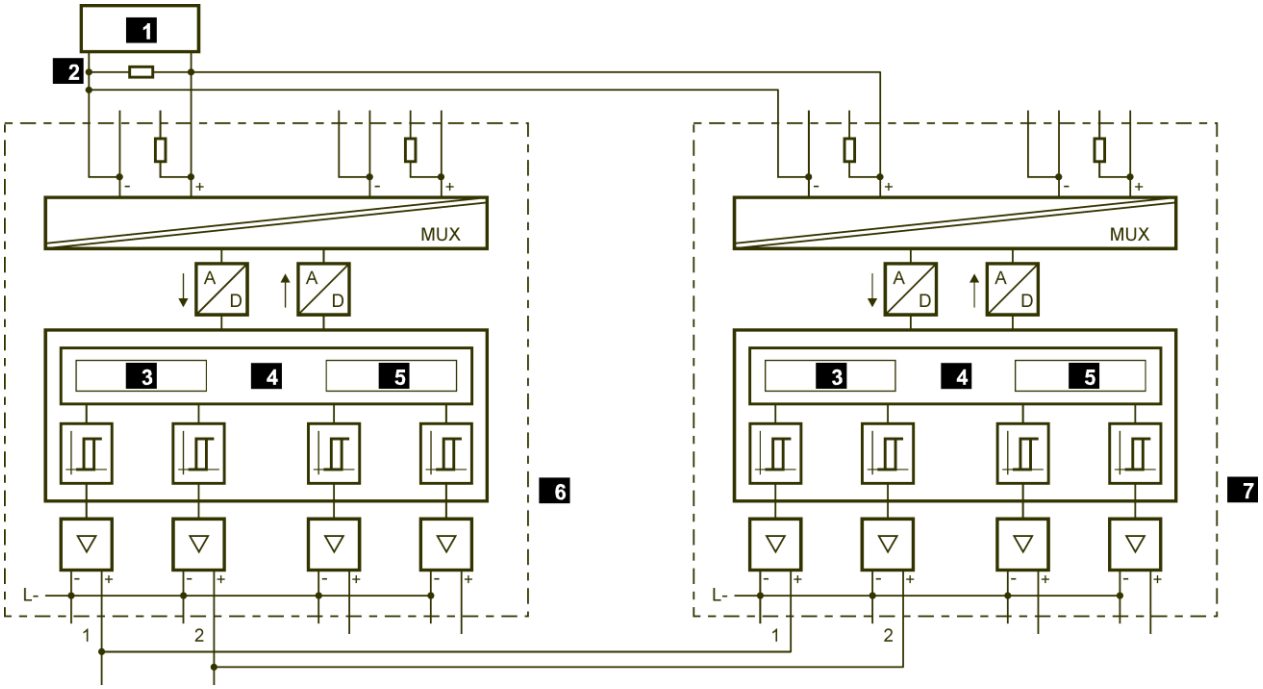


1 Transmitter 0…5 V
2 Processing unit 1
3 1oo2 system
4 Processing unit 2
5 Module 1
6 Module 2

Figure 5: Redundancy Operation, Voltage Input 0...5 V

Redundancy Operation, Current Input 4...20 mA

The current of a transmitter is connected to two independent 62 100 limit indicator modules. An additional resistor located externally to the limit indicator module is necessary for this wiring variant. Both modules are set to the same limit value and their outputs are connected in parallel. Failure of one limit indicator module does not affect the signal of the downstream logic circuit. In this mode of operation, no line diagnosis of the output circuits is possible.

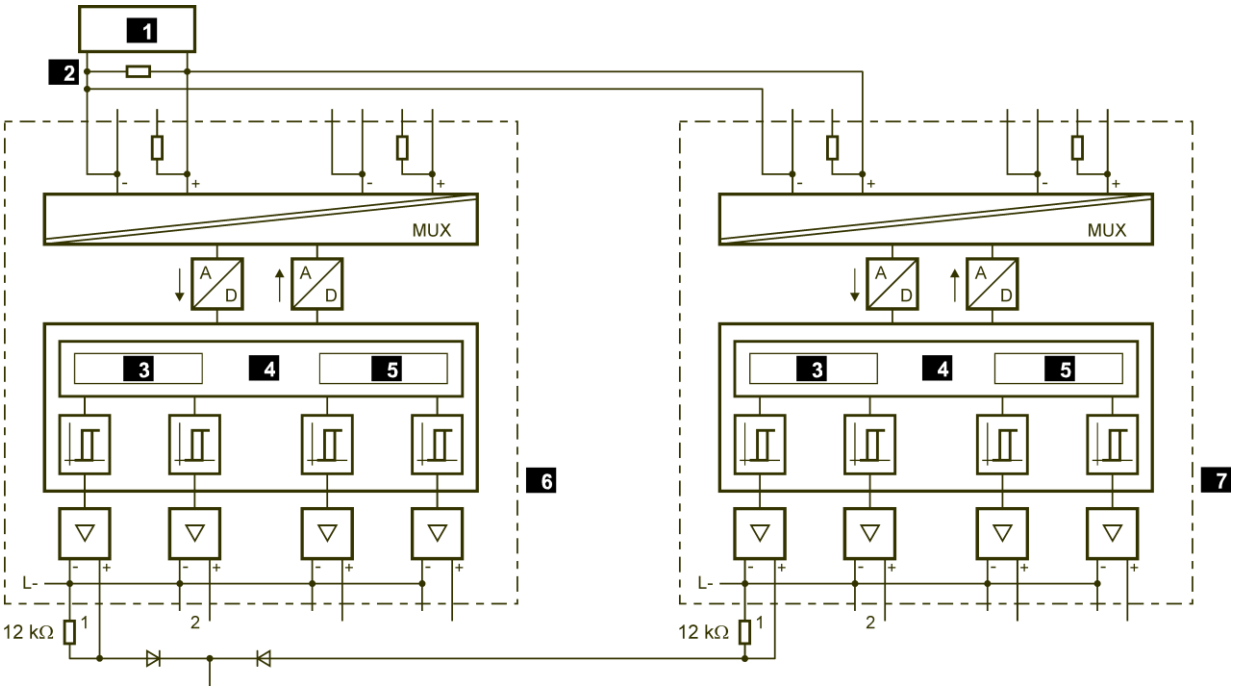


1 Transmitter 4…20 mA
2 Resistor 250 Ω / 0.05 %
3 Processing unit 1
4 1oo2 system
5 Processing unit 2
6 Module 1
7 Module 2

Figure 6: Redundancy Operation, Current Input 4...20 mA

Redundancy Operation in Accordance with the Energized to Trip Principle, with Current Input 4..20 mA

The current of a transmitter is connected to two independent 62 100 limit indicator modules. A resistor located externally to the limit indicator module is necessary for this wiring variant. Both modules are set to the same limit values and their outputs are connected in parallel and decoupled via diodes. Line diagnosis for the output circuit is active. Failure of one limit indicator module does not affect the signal of the downstream logic circuit.

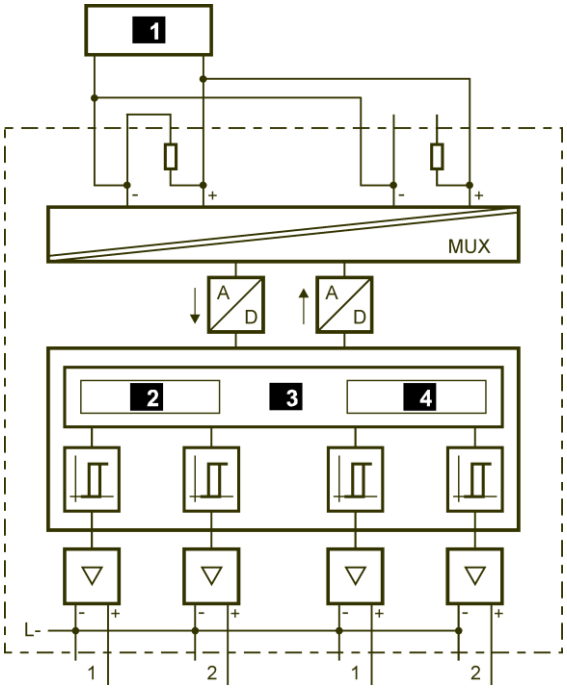


1 Transmitter 4…20 mA
2 Resistor 250 Ω / 0.05 %
3 Processing unit 1
4 1oo2 system
5 Processing unit 2
6 Module 1
7 Module 2

Figure 7: Redundancy Operation in Accordance with the Energized to Trip Principle, with Current Input 4..20 mA

Operation for More Than Two Limit Values for Each Transmitter

The current (voltage of channel 1) of one transmitter is also connected to the second channel of the limit indicator module.

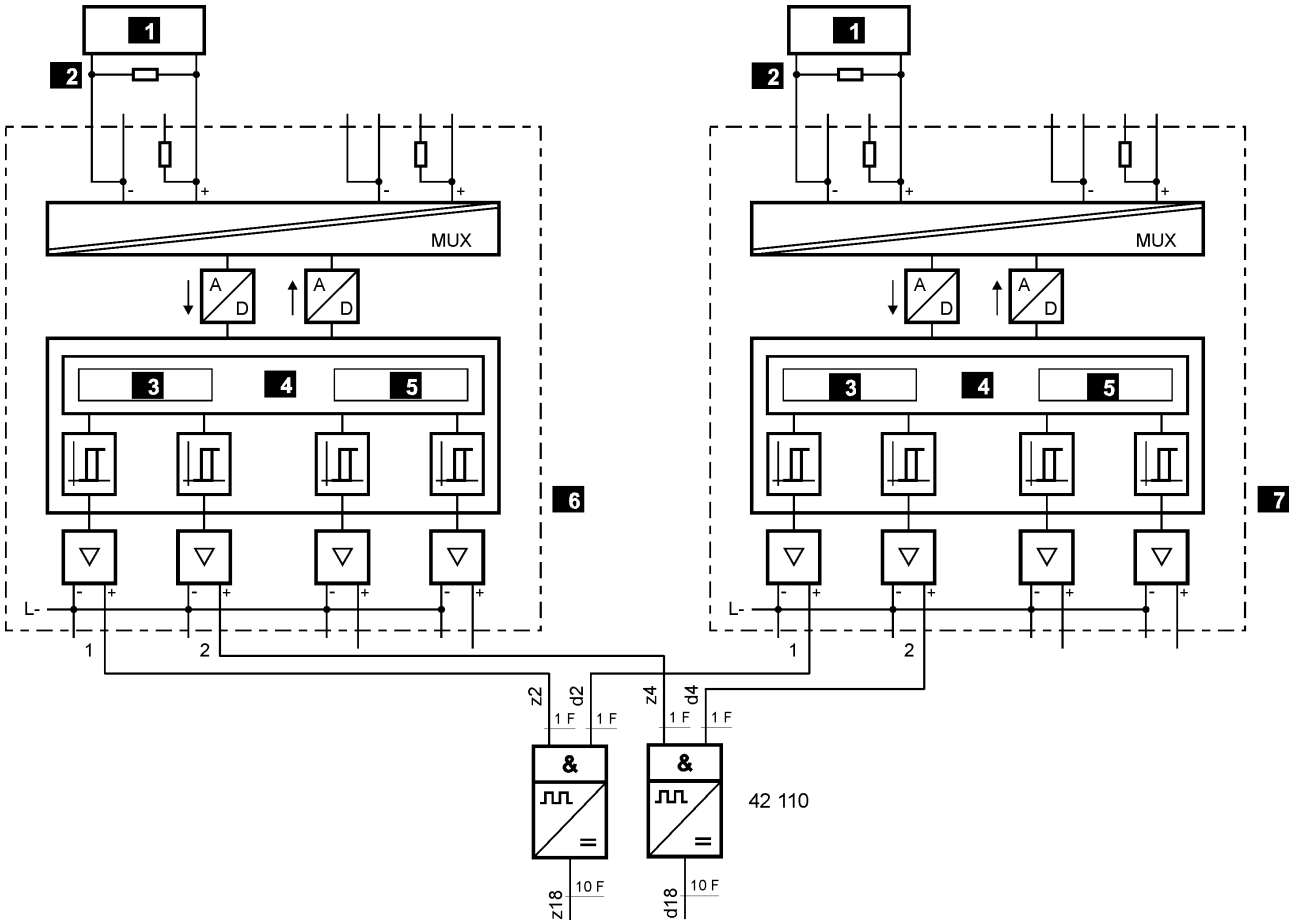


1 Transmitter 4…20 mA
2 Processing unit 1
3 1oo2 system
4 Processing unit 2

Figure 8: Operation for More Than Two Limit Values for Each Transmitter

Redundant SIL 4 Wiring (1oo2)

Each of the two 62 100 limit indicator modules is connected to a transmitter. Both modules are set to the same limit values and their outputs are connected via AND gate (e.g., the 42 110 module). If a limit indicator module fails, the outputs enter the safe state.

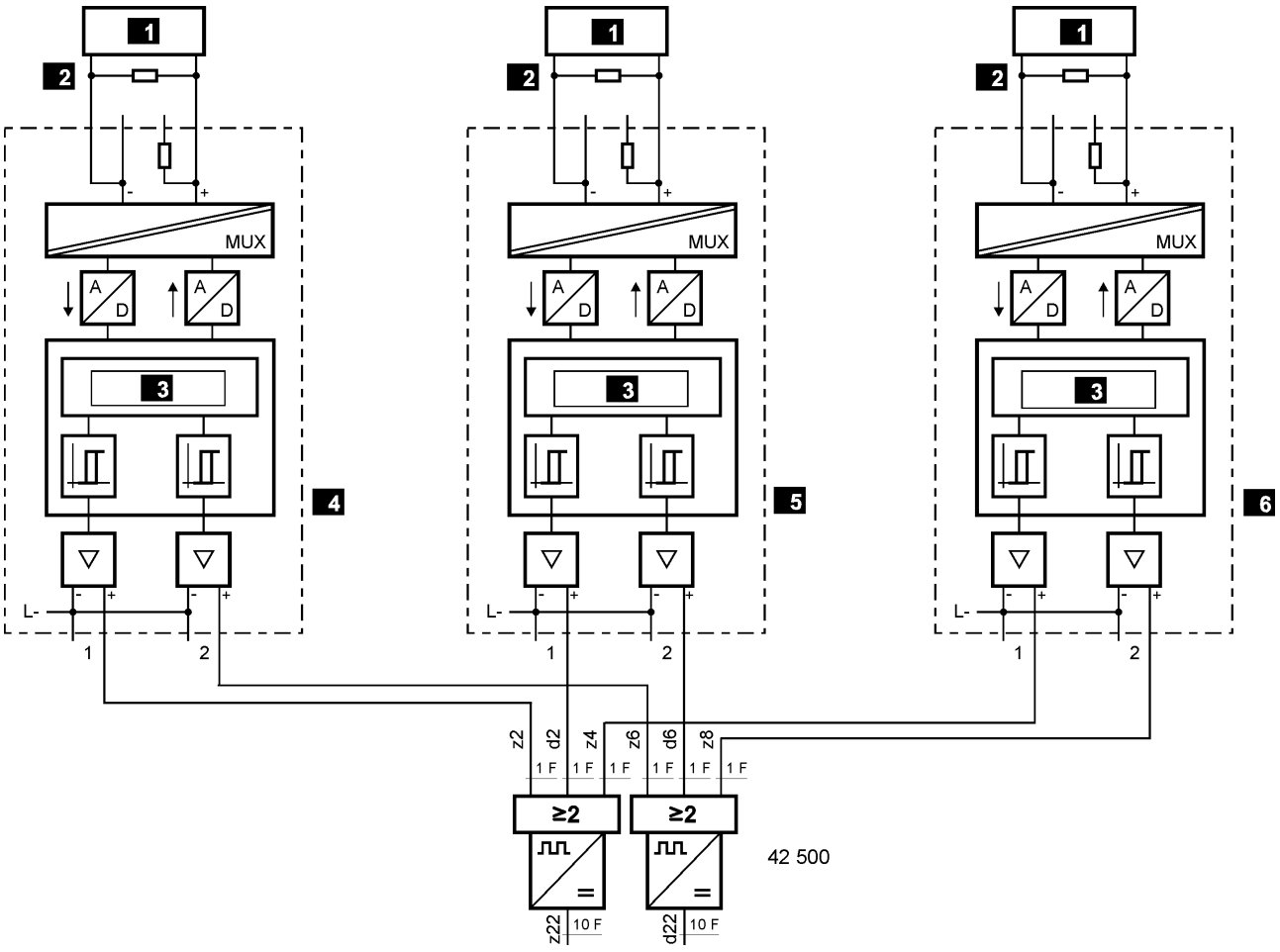


1 Transmitter 4…20 mA
2 Resistor 250 Ω / 0.05 %
3 Processing unit 1
4 1oo2 system
5 Processing unit 2
6 Module 1
7 Module 2

Figure 9: Redundant SIL 4 Wiring (1oo2)

Redundant SIL 4 Wiring (2oo3)

Each of the three 62 100 limit indicator modules is connected to a transmitter. The three modules use the same limit value setting and their outputs are connected via a 2oo2 voting element (e.g., the 42 500 module). If the two limit indicator modules fail, the outputs enter the safe state.



1 Transmitter 4…20 mA
2 Resistor 250 Ω / 0.05 %
3 1oo2 system
4 Module 1
5 Module 2
6 Module 3

Figure 10: Redundant SIL 4 Wiring (2oo3)

Communication via Modbus

Reading of Variables

Type BOOL: Function code 1
Type WORD: Function code 3
Events: Function codes 65, 66, 67

Relative address	Data type	Value	Description	Relative event no.
0	WORD	F1 H	Module type 62 100	
1	BOOL	0	None	
2	BOOL	1	Module removed	
3	BOOL	1	Communication with module not ok	
4	BOOL	1	Module in slot, communication ok	
5	BOOL	0	None	
6	BOOL	1	Module fault, ERR	
7	BOOL	1	Current in input and output circuits not ok (LS, LB)	
8...24	BOOL	0	None	
25	WORD	1)	Actual value of channel 1	
26	WORD	1)	Actual value of channel 2	
27	BOOL	1	1-signal at output d18, channel 1/1	24
28	BOOL	1	1-signal at output d20, channel 1/2	25
29	BOOL	1	1-signal at output d22, channel 2/1	26
30	BOOL	1	1-signal at output d24, channel 2/2	27
31	BOOL	1	1-signal at output z16, alarm	28
32...34	BOOL	0	None	
35	WORD	1)	**Additional information** + channel 1, limit value 1	
36	WORD	1)	**Additional information** + channel 1, limit value 2	
37	WORD	1)	**Additional information** + channel 2, limit value 1	
38	WORD	1)	**Additional information** + channel 2, limit value 2	

Table 7: All Specifications of the 62 100 Module

Value: 0 always has the opposite meaning
H: Hexadecimal value
1): Range 0...1125 in steps of 0.1 % (0...112.5 %)
Absolute address: A = p * 256 + relative address
Absolute event no.: E = (p - 1) * 32 + relative event no.
p = Slot no. in the subrack

Reading of All Variables

Function code 3, 84 WORDS

As of address 2000 H

	WORD 0 (16-bit)		WORD 1 (16-bit)	WORD 2 (16-bit)	WORD 3 (16-bit)	
Relative address	0	8…1	25	26		34…27
Data	Module type	Module status	Actual value of channel 1	Actual value of channel 2	None	Outputs

Reading of All Variables

Function code 3, 84 WORDS

As of address 3000 H

	WORD 0 (16-bit)		WORD 1 (16-bit)	WORD 2 (16-bit)	WORD 3 (16-bit)	
Relative address	0	8…1	35	36		34…27
Data	Module type	Module status	**Additional information** + channel 1, limit value 1	**Additional information** + channel 1, limit value 2	None	Outputs

Reading of All Variables

Function code 3, 84 WORDS

As of address 4000 H

	WORD 0 (16-bit)		WORD 1 (16-bit)	WORD 2 (16-bit)	WORD 3 (16-bit)	
Relative address	0	8…1	37	38		34…27
Data	Module type	Module status	**Additional information** + channel 2, limit value 1	**Additional information** + channel 2, limit value 2	None	Outputs

Additional Information

Bit number				Channel parameter setting
15	14	13	12	
0				Channel not operating
1				Channel operating
	0	0	0	Switching direction of the limit value: L (Low)
	0	0	1	Switching direction of the limit value: H (High)
	1	0	0	Rate of change: positive gradient
	1	0	1	Rate of change: negative gradient
	1	1	0	Rate of change: absolute gradient

Table 8: Additional Information

For error-free data transfer, all 84 WORDS must be read. This ensures that the variables of all the modules within a subrack are transferred. 0 is transferred for unused module slots.

Communication via PROFIBUS DP

Reading of Variables

Relative addresses of WORD and BYTE type

Module state, signals at the outputs

WORD	Bit	BYTE	Bit	Value	Description
0	0...7	0	0...7	F1 H	Module type 62 100
	8	1	0	0	None
	9		1	1	Module removed
	10		2	1	Communication with module not ok
	11		3	1	Module in slot, communication ok
	12		4	0	None
	13		5	1	Module fault, ERR
	14		6	1	Current in input and output circuits not ok (LS, LB)
	15		7	0	None
1...2		2...5		0	None
3	0	6	0	1	1-signal at output d18, channel 1/1
	1		1	1	1-signal at output d20, channel 1/2
	2		2	1	1-signal at output d22, channel 2/1
	3		3	1	1-signal at output d24, channel 2/2
	4		4	1	1-signal at output z16, alarm
	5...7		5...7	0	None
	8...15	7	0...7	0	None

Table 9: Module State, Signals at the Outputs

Value: 0 always has the opposite meaning

H: Hexadecimal value

Absolute address WORD: W = 4 * (p - 1) + relative address

Absolute address BYTE: B = 8 * (p - 1) + relative address

p = Slot no. in the subrack

Communication via PROFIBUS DP

Reading of Variables

Relative addresses of WORD and BYTE type

Module state, actual values, signals at the outputs

WORD	Bit	BYTE	Bit	Value	Description
0	0...7	0	0...7	F1 H	Module type 62 100
	8	1	0	0	None
	9		1	1	Module removed
	10		2	1	Communication with module not ok
	11		3	1	Module in slot, communication ok
	12		4	0	None
	13		5	1	Module fault, ERR
	14		6	1	Current in input and output circuits not ok (LS, LB)
	15		7	0	None
1	8...15	2	0...7	0...127	Actual value of channel 1 (high byte) in ‰
	0...7	3	0...7	0...127	Actual value of channel 1 (low byte) in ‰
2	8...15	4	0...7	0...127	Actual value of channel 2 (high byte) in ‰
	0...7	5	0...7	0...127	Actual value of channel 2 (low byte) in ‰
3	0	6	0	1	1-signal at output d18, channel 1/1
	1		1	1	1-signal at output d20, channel 1/2
	2		2	1	1-signal at output d22, channel 2/1
	3		3	1	1-signal at output d24, channel 2/2
	4		4	1	1-signal at output z16, alarm
	5...7		5...7	0	None
	8...15	7	0...7	0	None

Table 10: Module State, Actual Values, Signals at the Outputs

Value: 0 always has the opposite meaning

H: Hexadecimal value

Absolute address WORD: W = 4 * (p - 1) + 84 + relative address

Absolute address BYTE: B = 8 * (p - 1) + 168 + relative address

p = Slot no. in the subrack

Communication via PROFIBUS DP

Reading of Variables

Relative addresses of WORD and BYTE type

Limit values, switching direction, gradient

WORD	Bit	BYTE	Bit	Value	Description
0	15	0	7	1	Channel operating
	14...12		6...4	000	Switching direction of the limit value: L (Low)
				001	Switching direction of the limit value: H (High)
				100	Rate of change: positive gradient
				101	Rate of change: negative gradient
				110	Rate of change: absolute gradient
	0...11		0...3	0...15	Limit value of channel 1, output 1 (high byte) in ‰
		1	0...7	0...127	Limit value of channel 1, output 1 (low byte) in ‰
1	15	2	7	1	Channel operating
	14...12		6...4	000	Switching direction of the limit value: L (Low)
				001	Switching direction of the limit value: H (High)
				100	Rate of change: positive gradient
				101	Rate of change: negative gradient
				110	Rate of change: absolute gradient
	0...11		0...3	0...15	Limit value of channel 1, output 2 (high byte) in ‰
		3	0...7	0...127	Limit value of channel 1, output 2 (low byte) in ‰
2	15	4	7	1	Channel operating
	14...12		6...4	000	Switching direction of the limit value: L (Low)
				001	Switching direction of the limit value: H (High)
				100	Rate of change: positive gradient
				101	Rate of change: negative gradient
				110	Rate of change: absolute gradient
	0...11		0...3	0...15	Limit value of channel 2, output 1 (high byte) in ‰
		5	0...7	0...127	Limit value of channel 2, output 1 (low byte) in ‰
3	15	6	7	1	Channel operating
	14...12		6...4	000	Switching direction of the limit value: L (Low)
				001	Switching direction of the limit value: H (High)
				100	Rate of change: positive gradient
				101	Rate of change: negative gradient
				110	Rate of change: absolute gradient
	0...11		0...3	0...15	Limit value of channel 2, output 2 (high byte) in ‰
		7	0...7	0...127	Limit value of channel 2, output 2 (low byte) in ‰

Table 11: Limit Values, Switching Direction, Gradient

Value: 0 always has the opposite meaning

Absolute address WORD: W = 4 * (p - 1) + 168 + relative address

Absolute address BYTE: B = 8 * (p - 1) + 336 + relative address

p = Slot no. in relative subrack

Safety Parameters

The following table specifies the PFD, PFH and SFF values for a mono 62 100 module (1oo1) and for the redundant wiring variants (1oo2 and 2oo3).

Parameters	1oo1	1oo2	2oo3
PFD	1.626783e-005	3.250032e-007	3.26e-007
PFH	3.688015e-010	1.996562e-010	2.01e-010
SFF	99.97 %	99.97 %	99.9679 %
Proof test interval	10 years		

62 100 Analog Limit Indicator

System _____ Building _____ Control room_____

Module parameter setting
Cabinet _____ Subrack _____ Slot _____

Channel 1	Channel 2
_____	_____

❑ **2oo2 sensor wiring**

Channel 1

Input
❑ 4…20 mA / 1…5 V (with shutdown*)
❑ 4…20 mA / 1…5 V (with alarm only*)
* Whenever the permissible range of values is overrun or underrun
❑ 0…20 mA / 0…5 V

Output line diagnosis
❑ ON
❑ OFF

Signal evaluation output d18 _____
❑ Limit value _____ %
Hysteresis _____ %
❑ Gradient _____ % per _____ s
❑ Positive ❑ Negative ❑ Absolute
Switching direction ❑ Low ❑ High

Signal evaluation output d20 _____
❑ Limit value _____ %
Hysteresis _____ %
❑ Gradient _____ % per _____ s
❑ Positive ❑ Negative ❑ Absolute
Switching direction ❑ Low ❑ High

Channel 2

Input
❑ 4…20 mA / 1…5 V (with shutdown*)
❑ 4…20 mA / 1…5 V (with alarm only*)
* Whenever the permissible range of values is overrun or underrun
❑ 0…20 mA / 0…5 V

Output line diagnosis
❑ ON
❑ OFF

Signal evaluation output d22 _____
❑ Limit value _____ %
Hysteresis _____ %
❑ Gradient _____ % per _____ s

❑ Positive ❑ Negative ❑ Absolute
Switching direction ❑ Low ❑ High

Signal evaluation output d24 _____

❑ Limit value _____ %
Hysteresis _____ %
❑ Gradient _____ % per _____ s
❑ Positive ❑ Negative ❑ Absolute
Switching direction ❑ Low ❑ High

2oo2 sensor wiring

Evaluation of the sensors ❑ Mean value
❑ Maximum value
❑ Minimum value

Allowed value discrepancy _____ %
Allowed time discrepancy _____ s

Notes

Drafted_____ Approved _____ Date_____ Signature _____