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Safety Relays

PDIA 2 Drivers for SIMATIC S5 and S7 Operating Manual Item No. 20 205

pilz

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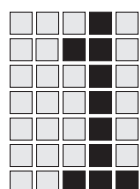
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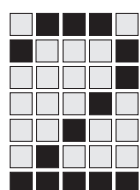
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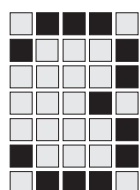
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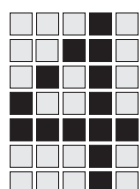
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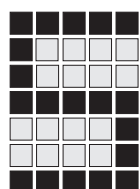


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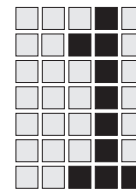


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Introduction

This operating manual describes the PDIA2 drivers for the SIMATIC S5 and SIMATIC S7 controllers.

For those working with the PDIA 2 interface module and PNOZplus safety relays, you should also be familiar with the information found in the following operating manuals:

- PDIA 2 operating manual
- PNOZ XM1 operating instructions
- PNOZ XE1 operating instructions
- PNOZ XE2 operating instructions

Knowledge and understanding of information contained in the "PDIA 2 Operating Manual" is assumed.

This manual is intended for instruction and should be retained for future reference.

Overview of manual

This operating manual is divided into the following chapters:

1 Introduction

The introduction is designed to familiarise the user with the content and structure of the manual and the definition of symbols used.

2 Overview

Provides information on the most important features of the driver and gives a brief outline of the application area.

3 Intended Use

Contains information about the intended use of the PDIA 2 drivers.

4 PDIA 2 Driver SIMATIC S5

Provides detailed information on the functionality of the PDIA 2 driver for the SIMATIC S5 and the structure of the data block.

5 PDIA 2 Driver SIMATIC S7

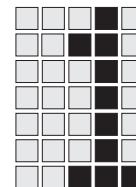
Provides detailed information on the functionality of the PDIA 2 driver for the SIMATIC S7 and the structure of the data block.

Introduction

Terminology

“PNOZplus” is the general designation for safety relays with diagnostic output. Throughout this manual the designation “PNOZplus” is used when the description is valid for all relays in the series.

If a description in the manual relates to a specific unit, then the product name for that unit will be used (e.g. PNOZ XM1).



Definition of symbols

Information in this manual that is of particular importance can be identified as follows:



DANGER!

This warning must be heeded! It warns of a **hazardous situation that poses an immediate threat of serious injury and death**, and indicates preventive measures that can be taken.



WARNING!

This warning must be heeded! It warns of a **hazardous situation that could lead to serious injury and death**, and indicates preventive measures that can be taken.



CAUTION!

This refers to a hazard that can lead to a less serious or minor injury plus material damage, and also provides information on preventive measures that can be taken.



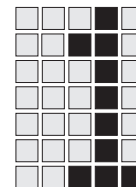
NOTICE

This describes a situation in which the product or devices in its immediate environment could be damaged. It also provides information on preventive measures that can be taken.



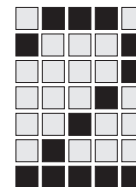
INFORMATION

This gives advice on applications and provides information on special features, as well as highlighting areas within the text that are of particular importance.



Introduction

Notes



Overview

The PDIA 2 drivers for the SIMATIC S5 and S7 read the diagnostic data of a PNOZplus safety relay from the PDIA 2. Diagnostic data is transmitted serially.

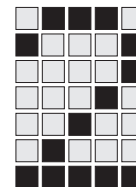
Following data is regarded as diagnostic data:

- Type of connected E-Stop or safety gate monitor (e.g. single-channel or dual-channel circuit etc.)
- Circuit status (open/closed)
- Start-up monitoring
- Synchronisation exceeded
- Partial operation error
- Wiring error
- Acknowledgement status (only with acknowledgement module PQUI)
- Relay status, start input, feedback control loop, reset button, start-up monitoring, time monitoring
- Non-volatile stored information for any repairs on the PNOZ XM1 (any repairs are carried out by Pilz exclusively).



INFORMATION

Exact information for diagnostic data of a PNOZplus relay can be found in the PDIA 2 operating manual.



Overview

Range

The software package “PDIA 2 Driver for SIMATIC S5 and S7” consists of

- one disk and
- “PDIA 2 Drivers for SIMATIC S5 and S7” operating manual

The disk contains the following files:

Doku directory:

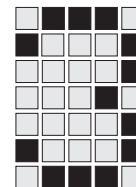
- 20205.PDF English operating manual

S5 directory:

- PDIA2DST.S5D S5 program
- PDIA2DZ0.SEQ S5 allocation list

S7 directory:

- PDIA2D.ZIP S7 project archive



Intended Use

PDIA 2 driver SIMATIC S5

The PDIA 2 driver SIMATIC S5 has been designed to be used with a SIMATIC S5 controller.

Parameters can be set for the driver and used in the following way:

- It can be connected to the PDIA 2 interface module
- It can be used to read diagnostic data from a PNOZplus safety relay via the PDIA 2 interface module.



INFORMATION

The PDIA 2 driver SIMATIC S5 is **not** suitable to use with the following controllers:

- S5-90U
- S5-100U CPU 1
- S5-100U CPU 2

PDIA 2 driver SIMATIC S7

The PDIA 2 driver SIMATIC S7 has been designed to be used with a SIMATIC S7 controller

Parameters can be set for the driver and used in the following way:

- It can be connected to the PDIA 2 interface module
- It can be used to read the diagnostic data from a PNOZplus safety relay via the PDIA 2 interface module.



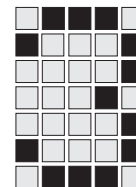
INFORMATION

The PDIA 2 driver SIMATIC S7 is **not** suitable to be used with the S7-500 controller.



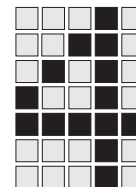
NOTICE

Please refer to the respective operating manuals for the intended use and proper application of PNOZplus safety relays and the PDIA 2 interface. Any safety guidelines stated should be followed and observed.



Intended Use

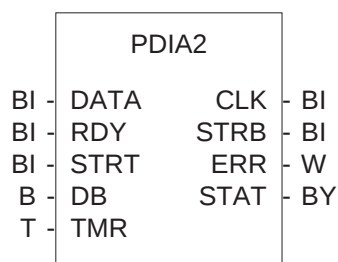
Notes



PDIA 2 Driver SIMATIC S5

PDIA2 S5 driver

Block header



Input parameters

- **DATA:** Data signal of PDIA 2 output *Od*
- **RDY:** Data Ready Signal of PDIA2 output *Or*
- **STRT:** Start reading
- **DB:** Data block
Diagnostic data and internal data of the function block fbPDIA 2 are stored in this data block.
Note: the data block must be ≥ 200 words.
- **TMR:** Free timer

Output parameters

- **CLK** Clock signal for PDIA2 input *Ic*
- **STRB** Strobe signal for PDIA2 input *Is*
- **ERR** Error code
(see error word *ERR*, pg. 4-3)
- **STAT** Status of the function block
(see output parameter *STAT*, pg. 4-3)

PDIA 2 Driver SIMATIC S5

Local flags

The range MW 248 ... MW 254 is used internally for local flags.

Function

The PDIA 2 driver SIMATIC S5 reads diagnostic data from a PNOZplus safety relay via the PDIA 2 interface module. The driver has 2 inputs and 2 outputs to enable the SIMATIC S5 to communicate with the PDIA 2. Diagnostic data is transmitted serially and stored in a data block.

Programming guidelines

The Ready-Signal *RDY* for the function block fbPDIA2 must be delayed by one cycle when

- the inputs from the input card have a different response time during a signal change from 0 to 1 and 1 to 0.
- **and** the difference of the input times > 0.4 ms.

One bit from the PDIA 2 can be read per each PLC cycle when

- the inputs required are loaded direct from the peripherals before the function block fbPDIA2 is called up
- **and** the outputs are transferred to the peripherals immediately after the block has been called up.



INFORMATION

To calculate the minimum scan time, see the PDIA 2 operating manual under the section "Data transfer sequence". Refer also to the programming example on page 4-14.



Reading diagnostic data

Diagnostic data is read when there is a positive edge at the input parameter *STRT*.

The block sets the output parameter *STAT* to 0000.



INFORMATION

Reading diagnostic data from the PDIA 2 interface module can take as long as 10 seconds. The length of time taken will depend on the number of circuits and the PLC scan time.

Output parameter *STAT*

Once the data has been read from the PDIA 2 interface module, one bit of the output parameter *STAT* is set.

The output parameter *STAT* is bit-oriented.
The following are valid for bit 00 ... 03 = 1:

- Bit 00: Diagnostic data is in the data block
(see the data block description on page 4-6)
- Bit 01: Error is present (global message)
- Bit 02: Communication error
the complete error message is in error word *ERR*, see page 4-3
- Bit 03: Fatal error on the PNOZ XM1
the complete error message is in error word *ERR*, see page 4-3

Error word *ERR*

If bit 01 and bit 02 = 1 in the output parameter *STAT* a communication error is present. In addition you will receive the following possible messages in error word *ERR*:

PDIA 2 Driver SIMATIC S5

- 0001_H: Time Out for the block (no reaction from the energised PDIA 2)
- 0002_H: Invalid length (< 2 or > 20) for the number of circuits

If bit 01 and bit 03 = 1 in the output parameter *STAT*, a fatal error is present in one of the PNOZplus devices. In addition you will receive a message in error word *ERR* (x is any hexadecimal digit):

- xxxx_H: error message (hex code)



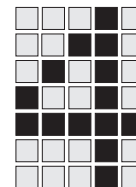
INFORMATION

If this error occurs, contact Pilz. Give the configuration for your PNOZplus and the hex code for the error word.

Blocks required

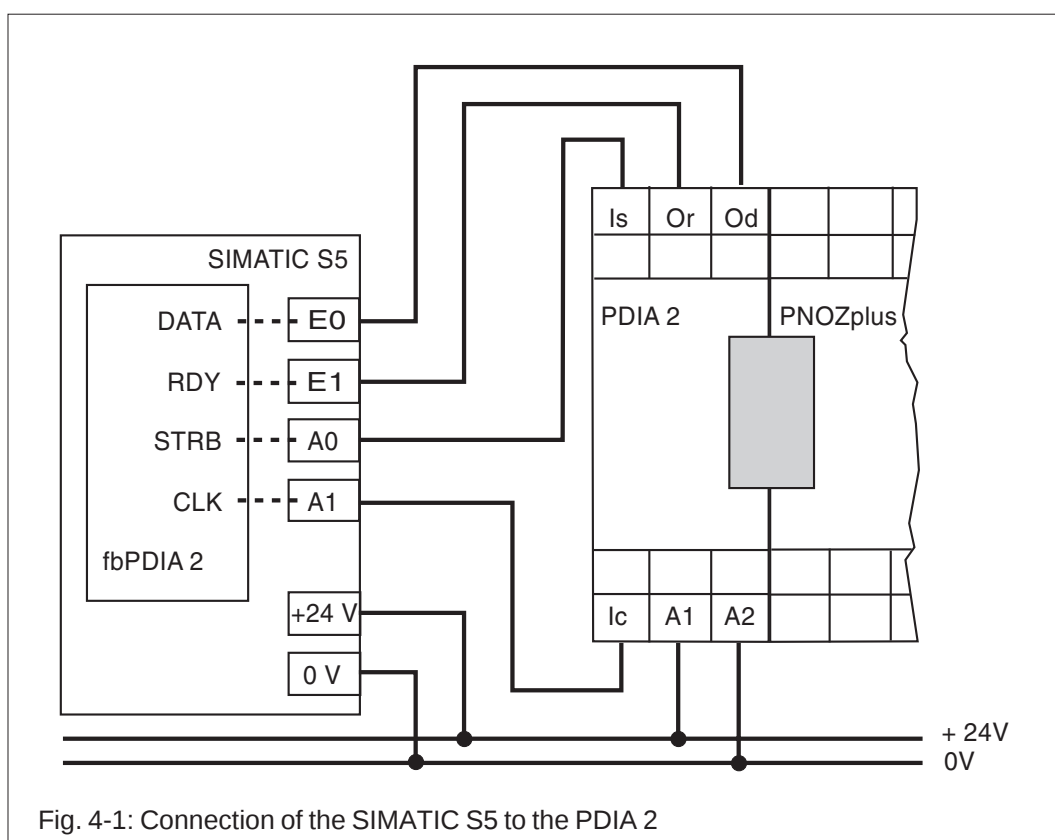
- FB10 fbPDIA2 Function block to read the data from the PDIA 2
- DB10 dbPDIA2Data Data block for the diagnostic data and the internal data of the function block fbPDIA2

Blocks FB10 and DB10 can be re-addressed using any address.



Connection SIMATIC S5 - PDIA 2

Fig. 4-1 shows the connection of the SIMATIC S5 to the PDIA 2 interface module. They also detect the allocation of the inputs and outputs of the controller and the PDIA 2 to the input and output parameters of the PDIA 2 drivers.



PDIA 2 Driver SIMATIC S5

Structure of the data block (input parameter *DB*)

The contents of the data block is valid if the output parameter *State* bit 01 =1 (see page 4-3).



INFORMATION

A full description of the structure of the diagnostic data, the data transfer sequence and the allocation of modules and circuits can be found in the “PDIA 2 Operating Manual”.

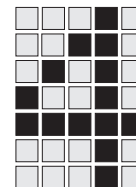
On the following pages you will find the data block divided into various sections:

Section	Page
Unit_ID	4-7
Version_Ch_A/B	4-7
Additional_inputs	4-7
Fatal_Error	4-7
Number_circuit	4-7
Module_n_circuittype	4-8
Module_n_LED_code	4-9
Circuit_n_LED_colour	4-10
Circuit_n_Flag	4-11
Module_n_PII	4-12
Circuit test	4-13



INFORMATION

The data block must consist of ≥ 200 words.



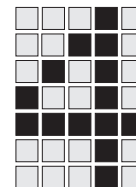
Section: unit_ID, version, addit_inputs, fatal_error, no. _circuit

Address	Name	Value	Note
DR 001	Unit_ID	0B PNOZ XM1 0C PQUI with PNOZ XM1	
DR 002	Version_Ch_A	Software version PNOZ XMIA channel A	
DR 003	Version_Ch_B	Software version PNOZ XMIA channel B	
DR 004	Addit_inputs	Bit 0 = 0 relay A energised Bit 0 = 1 relay A de-energised Bit 1 = 0 relay B energised Bit 1 = 1 relay B de-energised Bit 2 = 0 start input, start button pressed (24V) Bit 2 = 1 Start input, start button not pressed (0V) Bit 3 = 0 Feedback loop contac- tor de-energised (24V) Bit 3 = 1 Feedback loop contac- tor energised (0V) Bit 4 = 0 Reset button not pressed Bit 4 = 1 Reset button pressed Bit 5 = 0 Start monitoring not activated (24V) Bit 5 = 1 Start monitoring activated(0V) Bit 6 = 0 Time monitoring deactivated (24V) Bit 6 = 1 Time monitoring activated (0V) Bit 7 Always 0	
DR 005	Fatal_Error_Low		
DR 006	Fatal_Error_High		
DR 007	Number_circuits	2-20	

PDIA 2 Driver SIMATIC S5

Section: module_n_circuit type

Address	Name	Value	Note
DR 008	Module_01_circuit type	Bit 0-3 = circuit 01 Bit 4-7 = circuit 02 Value 0 Single-channel Value 1 Dual-channel Value 2 Single-channel position monitoring Value 3 Single-channel start test Value 4 Triple-channel Value 5 Dual-channel position monitoring Value 6 Dual-channel start-up testing Value 7 Not used Value 8 After power-up, all switch contacts open Value 9-15 Not used	Circuit 01: upper Circuit 02: lower
DR 009	Module_02_circuit type	As for module_01_circuit type	
DR010	Module_03_circuit type	As for module_01_circuit type	
DR011	Module_04_circuit type	As for module_01_circuit type	
DR012	Module_05_circuit type	As for module_01_circuit type	
DR013	Module_06_circuit type	As for module_01_circuit type	
DR014	Module_07_circuit type	As for module_01_circuit type	
DR015	Module_08_circuit type	As for module_01_circuit type	
DR016	Module_09_circuit type	As for module_01_circuit type	
DR017	Module_10_circuit type	As for module_01_circuit type	



Section: module_n_LED code

Address	Name	Value	Note
DR 018	Module_01_LED_Code	Bit 0-3 = circuit 01 Bit 4-7 = circuit 02 Value 0 LED off Value 1 LED on Value 2 LED flashes Value 3 LED flashes once wiring error S12/S42 Value 4 LED flashes twice wiring error S22/S52 Value 5 LED flashes three times wiring error S32/S62 Value 6 LED flashes four times partial operation Value 7 LED flashes five times synchronisation exceeded Value 8 LED flashes six times wiring error due to undefined circuit type Value 9-15 Not used	Circuit 01: upper Circuit 02: lower
DR019	Module_02_LED_Code	As for module_01_LED_code	
DR020	Module_03_LED_Code	As for module_01_LED_code	
DR021	Module_04_LED_Code	As for module_01_LED_code	
DR022	Module_05_LED_Code	As for module_01_LED_code	
DR023	Module_06_LED_Code	As for module_01_LED_code	
DR024	Module_07_LED_Code	As for module_01_LED_code	
DR025	Module_08_LED_Code	As for module_01_LED_code	
DR026	Module_09_LED_Code	As for module_01_LED_code	
DR027	Module_10_LED_Code	As for module_01_LED_code	

PDIA 2 Driver SIMATIC S5

Section: circuit_n_LED_colour

Address	Name	Value	Note
DL 028	Circuit_01_LED_colour	Bit 0-5 = For internal purposes Bit6=1/Bit7=0 LED is green Bit6=0/Bit7=1 LED is red Bit6=1/Bit7=1 LED is yellow	
DL 029	Circuit_02_LED_colour	As for circuit_01_LED_colour	
DL 030	Circuit_03_LED_colour	As for circuit_01_LED_colour	
DL 031	Circuit_04_LED_colour	As for circuit_01_LED_colour	
DL 032	Circuit_05_LED_colour	As for circuit_01_LED_colour	
DL 033	Circuit_06_LED_colour	As for circuit_01_LED_colour	
DL 034	Circuit_07_LED_colour	As for circuit_01_LED_colour	
DL 035	Circuit_08_LED_colour	As for circuit_01_LED_colour	
DL 036	Circuit_09_LED_colour	As for circuit_01_LED_colour	
DL 037	Circuit_10_LED_colour	As for circuit_01_LED_colour	
DL 038	Circuit_11_LED_colour	As for circuit_01_LED_colour	
DL 039	Circuit_12_LED_colour	As for circuit_01_LED_colour	
DL 040	Circuit_13_LED_colour	As for circuit_01_LED_colour	
DL 041	Circuit_14_LED_colour	As for circuit_01_LED_colour	
DL 042	Circuit_15_LED_colour	As for circuit_01_LED_colour	
DL 043	Circuit_16_LED_colour	As for circuit_01_LED_colour	
DL 044	Circuit_17_LED_colour	As for circuit_01_LED_colour	
DL 045	Circuit_18_LED_colour	As for circuit_01_LED_colour	
DL 046	Circuit_19_LED_colour	As for circuit_01_LED_colour	
DL 047	Circuit_20_LED_colour	As for circuit_01_LED_colour	



Section: circuit_n_flag

Address	Name	Value	Note
DL 048	Schalter_01_Flag	Bit 0 = 1 Wiring error (see also LED code) Bit 1 = 1 Start-up monitoring (safety gate open/close) Bit 2 = 1 Fully open Bit 3 = 1 Closed Bit 4 = 1 Synchronisation monitoring Bit 5 = 1 Synchronisation exceeded Bit 6 + 7 For internal purposes	If bit 0,3,5 = 1, the other bits are not valid. If, for example bit 0=1 the status of circuit cannot be determined using the other bits
DL 049	Circuit_02_flag	As for circuit_01_flag	
DL 050	Circuit_03_flag	As for circuit_01_flag	
DL 051	Circuit_04_flag	As for circuit_01_flag	
DL 052	Circuit_05_flag	As for circuit_01_flag	
DL 053	Circuit_06_flag	As for circuit_01_flag	
DL 054	Circuit_07_flag	As for circuit_01_flag	
DL 055	Circuit_08_flag	As for circuit_01_flag	
DL 056	Circuit_09_flag	As for circuit_01_flag	
DL 057	Circuit_10_flag	As for circuit_01_flag	
DL 058	Circuit_11_flag	As for circuit_01_flag	
DL 059	Circuit_12_flag	As for circuit_01_flag	
DL 060	Circuit_13_flag	As for circuit_01_flag	
DL 061	Circuit_14_flag	As for circuit_01_flag	
DL 062	Circuit_15_flag	As for circuit_01_flag	
DL 063	Circuit_16_flag	As for circuit_01_flag	
DL 064	Circuit_17_flag	As for circuit_01_flag	
DL 065	Circuit_18_flag	As for circuit_01_flag	
DL 066	Circuit_19_flag	As for circuit_01_flag	
DL 067	Circuit_20_flag	As for circuit_01_flag	

PDIA 2 Driver SIMATIC S5

Section: module_n_PII

Address	Name	Value	Note
DL 068	Module_01_PII	Bit 0 = 0 S12 open Bit 0 = 1 S12 closed Bit 1 = 0 S22 open Bit 1 = 1 S22 closed Bit 2 = 0 S32 open Bit 2 = 1 S32 closed Bit 3 Always 0 Bit 4 = 0 S42 open Bit 4 = 1 S42 closed Bit 5 = 0 S52 open Bit 5 = 1 S52 closed Bit 6 = 0 S62 open Bit 6 = 1 S62 closed Bit 7 Always 0	The PII is only displayed when all circuits are not closed (e-stop, gate switch) !
DL 069	Module_02_PII	Module_01_PII	
DL 070	Module_03_PII	Module_01_PII	
DL 071	Module_04_PII	Module_01_PII	
DL 072	Module_05_PII	Module_01_PII	
DL 072	Module_06_PII	Module_01_PII	
DL 073	Module_07_PII	Module_01_PII	
DL 074	Module_08_PII	Module_01_PII	
DL 076	Module_09_PII	Module_01_PII	
DL 077	Module_10_PII	Module_01_PII	



Section: circuit monitoring:

The circuits can be easily tested using the following bit-oriented data.

Byte address	Name	Bit address								Note
		7	6	5	4	3	2	1	0	
DL078	Circuit_present_no	08	07	06	05	04	03	02	01	True = present
DL079	Circuit_present_no	16	15	14	13	12	11	10	09	True = present
DL080	Circuit_present_no					20	19	18	17	True = present
DL081	Clrcuit_closed_no.	08	07	06	05	04	03	02	01	True = closed
DL082	Clrcuit_closed_no.	16	15	14	13	12	11	10	09	True = closed
DL083	Clrcuit_closed_no.					20	19	18	17	True = closed
DL084	Circuit_test_no.	08	07	06	05	04	03	02	01	True = test
DL085	Clrcuit_test_no.	16	15	14	13	12	11	10	09	True = test
DL086	Circuit_test_no.					20	19	18	17	True = test
DL087	Circuit_open_no.	08	07	06	05	04	03	02	01	True = open
DL088	Circuit_open_no.	16	15	14	13	12	11	10	09	True = open
DL089	Circuit_open_no.					20	19	18	17	True = open
DL090	Clrcuit_error-no.	08	07	06	05	04	03	02	01	True = error
DL091	Circuit_error-no.	16	15	14	13	12	11	10	09	True = error
DL092	Circuit_error-no.					20	19	18	17	True = error
DL093	Circuit_acknowledge_no.	08	07	06	05	04	03	02	01	True = acknowledge (PQUI only)
DL094	Circuit_acknowledge_no.	16	15	14	13	12	11	10	09	True = acknowledge (PQUI only)
DL095	Circuit_acknowledge_no.					20	19	18	17	True = acknowledge (PQUI only)

PDIA 2 Driver SIMATIC S5

Example

The PDIA 2 interface module is connected to the I/Os of the SIMATIC S5 as described in the following table.

Connection PDIA 2	SIMATIC S5	FB PDIA 2
Od	E8.1	DATA
Or	E8.0	RDY
Ic	A4.1	CLK
Is	A4.0	STRB

E 9.0 = 1: start to read the diagnostic data

E 9.1 = 1: stop a continual reading of diagnostic data

Segment 1 0000 Application example

·***
·

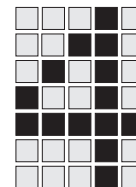
Segment 2 0001 Form start flag

:U E 9.0 Start
:U(
:ON M 15.0 Start pulse
:O E 9.1 No start
:= M 15.3 Start reading
·***
·

Segment 3 0008 Inputs from peripherals

:L PY 8
:T MB 10 Current periphery image
·***
·

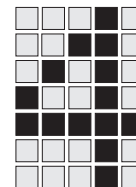
Segment 4 000B Block call up



```

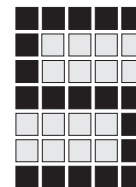
:SPA FB 10
Name: PDIA2
DATA: M 10.1 PDIA2 Od (from peripherals)
RDY : M 15.4 PDIA2 Or (delayed by one cycle)
STRT: M 15.3 Start reading
DB : DB 10 Diagnostic data
TMR : T 1 Time function element for timing
CLK : A 4.1 PDIA2 Ic
STRB: A 4.0 PDIA2 Is
ERR : MW 12 Error word
STAT: MB 14 Status
:
.***
Segment 5 0018 Outputs to the peripherals
:L AB 4
:T PY 4
.***
Segment 6 001B Ready delayed by one cycle
:U M 10.0 PDIA2 Or (from peripherals)
:= M 15.4 PDIA2 Or (delayed by one cycle)
.***
Segment 7 001E Edge evaluation for start
:U M 14.0 Reading complete
:UN M 15.1 Auxiliary flag pulse start
:= M 15.0 Pulse start
.***
Segment 8 0022 Auxiliary flag edge start
:U M 14.0 Reading finished
:= M 15.1 Auxiliary flag pulse start
.***
Segment 9 0025 Block end
:BE

```



PDIA 2 Driver SIMATIC S5

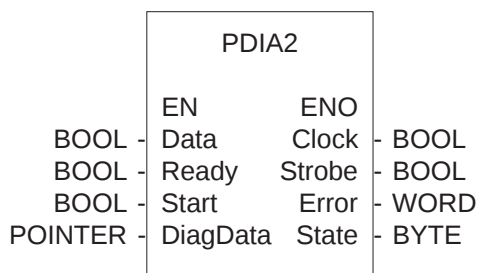
Notes



PDIA 2 Driver SIMATIC S7

PDIA2 S7 driver

Block header



Input parameter

- *EN*: Enable input
- *Data*: Data signal of the PDIA2 output *Od*
- *Ready*: Data ready signal of the PDIA2 output *Or*
- *Start*: Start the reading process
- *DiagData*: Pointer for the start of the memory range for diagnostic data
Note: the memory range in a data block must be ≥ 101 bytes.

Output parameter

- *ENO*: Enable output
- *Clock*: Clock signal for PDIA2 input *Ic*
- *Strobe*: Strobe signal for PDIA2 input *Is*
- *Error*: Error word
(see error word *Error*, S.5-3)
- *State*: Status of the block function
(see output parameter *State*, page 5-3)

PDIA-2 Driver SIMATIC S7

Function

The PDIA 2 driver SIMATIC S7 reads the diagnostic data from a PNOZplus safety relay via the PDIA 2 interface module. The driver has 2 inputs and 2 outputs for a SIMATIC S7 to communicate with the PDIA 2 interface module. Diagnostic data is transmitted serially and is stored in a data block.

Programming notes

The signal *Ready* for the function block fbPDIA2 must be delayed by one cycle if

- the inputs for the input card have a different response time during a signal change from 0 to 1 and 1 to 0.
- **and** the difference in the response times > 0.4 ms.

One bit from the PDIA 2 can be read per each PLC-cycle if

- the inputs required are loaded directly from the peripherals before calling up the function block fbPDIA2
- **and** the outputs are transferred to the peripherals immediately after the block fbPDIA2 has been called up.



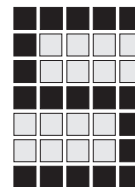
INFORMATION

To calculate the minimum scan time, please refer to the PDIA 2 operating manual "Sequence for data transfer". Refer also to the programming example on page 5-14.

Reading diagnostic data

The positive edge of the input parameter *Start* triggers reading the diagnostic data.

The block sets the output parameter *State* = 0000.



INFORMATION

Reading diagnostic data from the PDIA2 interface module can take up to 10 seconds. The length of time taken will depend on the number of circuits and the PLC scan time.

Output parameter *State*

Once the diagnostic data has been read from the PDIA 2 interface module, one bit of the output parameter *State* is set.

The output parameter *State* is bit-oriented. The following are valid for bit 00 ... 03 = 1:

- Bit 00: Diagnostic data is in the data block
(see data block description on page 5-5)
- Bit 01: An error is present (global message)
- Bit 02: Communication error
the full error message is in the error word *Error*, see page 5-3
- Bit 03: Fatal error on the PNOZ XM1
the full error message is in the error word *Error*, see page 5-3

Error word *Error*

If bit 01 and bit 02 = 1 for the output parameter *State*, a communication error is present. In addition you will receive the following possible messages in the error word *Error*:

- 0001_H: Time Out of the block (no reaction from the energised PDIA 2)
- 0002_H: Length is invalid (< 2 or > 20) for the number of circuits

If bit 01 and bit 03 = 1 for the output parameter *State*, a fatal error is present in a PNOZplus device. In addition you will receive a message in the error word *Error* (x is any hexadecimal digit):

- xxxx_H: error message (hex code)

PDIA-2 Driver SIMATIC S7



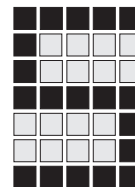
INFORMATION

If this occurs, contact Pilz. State the configuration for your PNOZplus and the hex code for the error word.

Blocks required

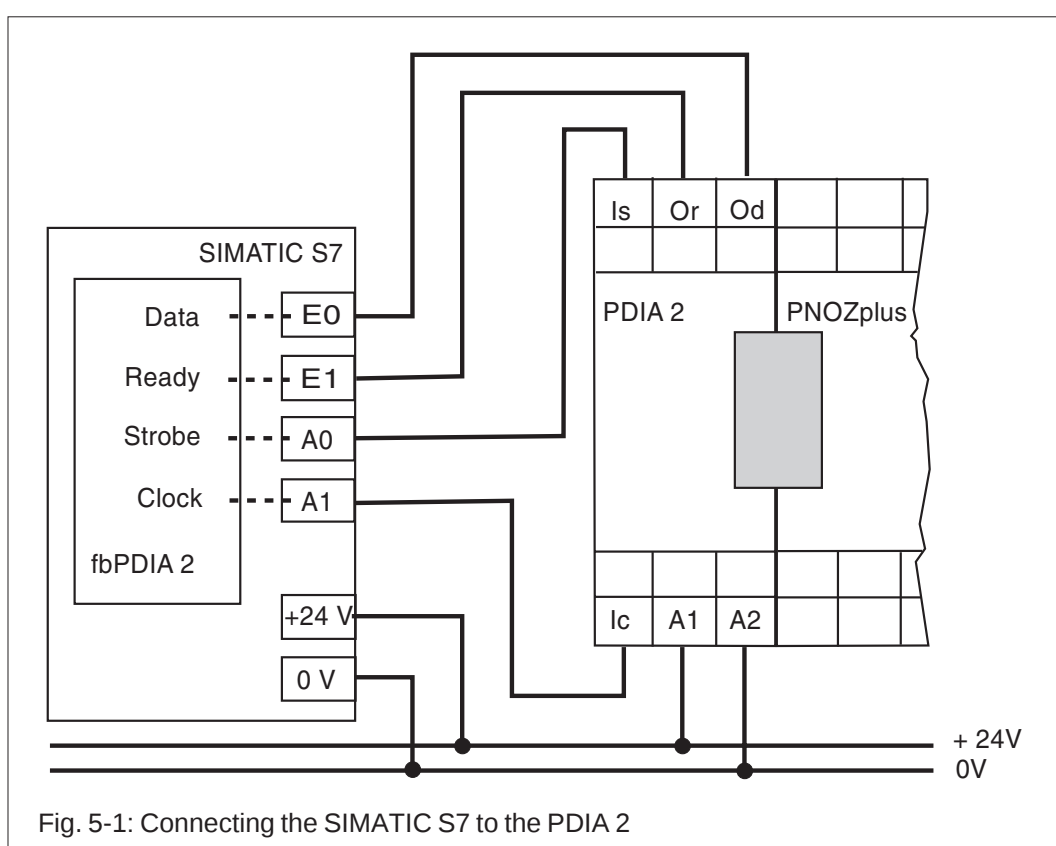
- FB1* fbPDIA2 Function block to read data from the PDIA 2
- DB1* diPDIA2 Instance block for function block fbPDIA2
- DB10* dbDiagData Data block for the daignostic data
- UDT10* udtDiagData Data type for the diagnostic data
- SFC21 sfcFILL System function "Assign field"
- SFC64 sfcTIMETCK System function "Read system time"

* These blocks can be re-addressed.



Connection: SIMATIC S7 - PDIA 2

Fig. 5-1 shows the connection of the SIMATIC S7 to the PDIA 2 interface module. They detect the allocation of the I/Os from the controller and the PDIA 2 to the I/O parameters of the PDIA 2 driver.



PDIA 2 Driver SIMATIC S7

Structure of the data range for diagnostic data (input parameter *DiagData*)

There is a user data type `udtDiagData` available to establish the memory range for the diagnostic data.

The contents of the memory range is valid if the output parameter *State* bit 01 =1 (see page 5-3).



INFORMATION

Detailed description of the structure of the diagnostic data, the data transfer sequence and the allocation of modules and circuits can be found in the “PDIA 2 operating manual”.

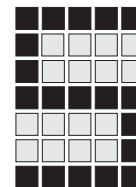
On the following pages you will find the structure of the user data type that is supplied. This has been divided into sections:

Section	Page
Unit_ID	5-7
Version_Ch_A/B	5-7
Addit_inputs	5-7
Fatal_Error	5-7
No._circuit	5-8
Module_n_circuittype	5-8
Module_n_LED_code	5-9
Circuit_n_LED_colour	5-10
Circuit_n_Flag	5-11
Module_n_PII	5-12
Circuit test	5-13



INFORMATION

The memory range must be ≥ 101 bytes.



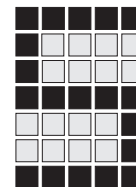
Section: unit_ID, version, addit_inputs, fatal_error, no._circuits

Adresse	Type	Name	Value	Note
+ 0.0	Byte	Unit_ID	0B PNOZ XM1 0C PQUI mit PNOZ XM1	
+ 1.0	Byte	Version_Ch_A	Software version PNOZ XMIA channel A	
+ 2.0	Byte	Version_Ch_B	Software version PNOZ XMIA channel B	
+ 3.0	Byte	Addit_inputs	Bit 0 = 0 Relay A energised Bit 0 = 1 Relay A de-energised Bit 1 = 0 Relay B energised Bit 1 = 1 Relay B de-energised Bit 2 = 0 Start input, start button pressed (24V) Bit 2 = 1 Start input, start button not pressed (0V) Bit 3 = 0 Feedback loop contac- tors de-energised (24V) Bit 3 = 1 Feedback loop contac- tors energised (0V) Bit 4 = 0 Reset button not pressed Bit 4 = 1 Reset button pressed Bit 5 = 0 Start monitoring deactivated (24V) Bit 5 = 1 Start monitoring activated (0V) Bit 6 = 0 Time monitoring deactivated (24V) Bit 6 = 1 Time monitoring activated (0V) Bit 7 Always 0	
+ 4.0	Byte	Fatal_Error_Low		
+ 5.0	Byte	Fatal_Error_High		
+ 6.0	Byte	Number_circuits	2-20	

PDIA 2 Driver SIMATIC S7

Section: module_n_circuit type

Address	Type	Name	Value	Note
+ 7.0	Byte	Module_01_circuit type	Bit 0-3 = Circuit 01 Bit 4-7 = Circuit 02 Value 0 Single-channel Value 1 Dual-channel Value 2 Single-channel position monitoring Value 3 Single-channel start test Value 4 Triple-channel Value 5 Dual-channel position monitoring Value 6 Dual-channel start-up test Value 7 not used Value 8 After power on All switch contacts open Value 9-15 Not used	Circuit 01: upper Circuit 02: lower
+ 8.0	Byte	Module_02_circuit type	As for module_01_circuit type	
+ 9.0	Byte	Module_03_circuit type	As for module_01_circuit type	
+ 10.0	Byte	Module_04_circuit type	As for module_01_circuit type	
+ 11.0	Byte	Module_05_circuit type	As for module_01_circuit type	
+ 12.0	Byte	Module_06_circuit type	As for module_01_circuit type	
+ 13.0	Byte	Module_07_circuit type	As for module_01_circuit type	
+ 14.0	Byte	Module_08_circuit type	As for module_01_circuit type	
+ 15.0	Byte	Module_09_circuit type	As for module_01_circuit type	
+ 16.0	Byte	Module_10_circuit type	As for module_01_circuit type	



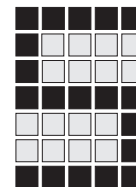
Section: module_n_LED code

Address	Type	Name	Value	Note
+ 17.0	Byte	Module_01_LED_code	Bit 0-3 = circuit 01 Bit 4-7 = circuit 02 Value 0 LED off Value 1 LED on Value 2 LED flashes Value 3 LED flashes once wiring error S12/S42 Value 4 LED flashes twice wiring error S22/S52 Value 5 LED flashes three times wiring error S32/S62 Value 6 LED flashes four times partial operation Value 7 LED flashes five times synchronisation exceeded Value 8 LED flashes six times wiring error due to undefined circuit type Value 9-15 Not used	Circuit 01: upper Circuit 02: lower
+ 18.0	Byte	Module_02_LED_code	As for module_01_LED_code	
+ 19.0	Byte	Module_03_LED_code	As for module_01_LED_code	
+ 20.0	Byte	Module_04_LED_code	As for module_01_LED_code	
+ 21.0	Byte	Module_05_LED_code	As for module_01_LED_code	
+ 22.0	Byte	Module_06_LED_code	As for module_01_LED_code	
+ 23.0	Byte	Module_07_LED_code	As for module_01_LED_code	
+ 24.0	Byte	Module_08_LED_code	As for module_01_LED_code	
+ 25.0	Byte	Module_09_LED_code	As for module_01_LED_code	
+ 26.0	Byte	Module_10_LED_code	As for module_01_LED_code	

PDIA 2 Driver SIMATIC S7

Section: circuit_n_LED_colour

Address	Type	Name	Value	Note
+ 27.0	Byte	Circuit_01_LED_colour	Bit 0-5 = For internal purposes Bit 6=1/bit 7=0 LED is green Bit 6=0/bit 7=1 LED is red Bit 1/bit 7=1 LED is yellow	
+ 28.0	Byte	Circuit_02_LED_colour	As for circuit_01_LED_colour	
+ 29.0	Byte	Circuit_03_LED_colour	As for circuit_01_LED_colour	
+ 30.0	Byte	Circuit_04_LED_colour	As for circuit_01_LED_colour	
+ 31.0	Byte	Circuit_05_LED_colour	As for circuit_01_LED_colour	
+ 32.0	Byte	Circuit_06_LED_colour	As for circuit_01_LED_colour	
+ 33.0	Byte	Circuit_07_LED_colour	As for circuit_01_LED_colour	
+ 34.0	Byte	Circuit_08_LED_colour	As for circuit_01_LED_colour	
+ 35.0	Byte	Circuit_09_LED_colour	As for circuit_01_LED_colour	
+ 36.0	Byte	Circuit_10_LED_colour	As for circuit_01_LED_colour	
+ 37.0	Byte	Circuit_11_LED_colour	As for circuit_01_LED_colour	
+ 38.0	Byte	Circuit_12_LED_colour	As for circuit_01_LED_colour	
+ 39.0	Byte	Circuit_13_LED_colour	As for circuit_01_LED_colour	
+ 40.0	Byte	Circuit_14_LED_colour	As for circuit_01_LED_colour	
+ 41.0	Byte	Circuit_15_LED_colour	As for circuit_01_LED_colour	
+ 42.0	Byte	Circuit_16_LED_colour	As for circuit_01_LED_colour	
+ 43.0	Byte	Circuit_17_LED_colour	As for circuit_01_LED_colour	
+ 44.0	Byte	Circuit_18_LED_colour	As for circuit_01_LED_colour	
+ 45.0	Byte	Circuit_19_LED_colour	As for circuit_01_LED_colour	
+ 46.0	Byte	Circuit_20_LED_colour	As for circuit_01_LED_colour	



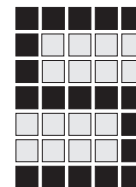
Section: circuit_n_flag

Address	Type	Name	Value	Note
+ 47.0	Byte	Circuit_01_flag	Bit 0 = 1 Wiring error (see also LED code) Bit 1 = 1 Start-up monitoring (safety gate open/close) Bit 2 = 1 Fully open Bit 3 = 1 Closed Bit 4 = 1 Synchronis. monitoring Bit 5 = 1 Synchronisation exceeded Bit 6 + 7 For internal purposes	If Bit 0,3,5 = 1, the other bits are not valid. If, for example bit 0 = 1 the status of the circuit cannot be determined from the other bits
+ 48.0	Byte	Circuit_02_flag	As for circuit_01_flag	
+ 49.0	Byte	Circuit_03_flag	As for circuit_01_flag	
+ 50.0	Byte	Circuit_04_flag	As for circuit_01_flag	
+ 51.0	Byte	Circuit_05_flag	As for circuit_01_flag	
+ 52.0	Byte	Circuit_06_flag	As for circuit_01_flag	
+ 53.0	Byte	Circuit_07_flag	As for circuit_01_flag	
+ 54.0	Byte	Circuit_08_flag	As for circuit_01_flag	
+ 55.0	Byte	Circuit_09_flag	As for circuit_01_flag	
+ 56.0	Byte	Circuit_10_flag	As for circuit_01_flag	
+ 57.0	Byte	Circuit_11_flag	As for circuit_01_flag	
+ 58.0	Byte	Circuit_12_flag	As for circuit_01_flag	
+ 60.0	Byte	Circuit_13_flag	As for circuit_01_flag	
+ 60.0	Byte	Circuit_14_flag	As for circuit_01_flag	
+ 61.0	Byte	Circuit_15_flag	As for circuit_01_flag	
+ 62.0	Byte	Circuit_16_flag	As for circuit_01_flag	
+ 63.0	Byte	Circuit_17_flag	As for circuit_01_flag	
+ 64.0	Byte	Circuit_18_flag	As for circuit_01_flag	
+ 65.0	Byte	Circuit_19_flag	As for circuit_01_flag	
+ 66.0	Byte	Circuit_20_flag	As for circuit_01_flag	

PDIA 2 Driver SIMATIC S7

Section: module_n_PII

Address	Type	Name	Value	Note
+ 67.0	Byte	Module_01_PII	Bit 0 = 0 S12 open Bit 0 = 1 S12 closed Bit 1 = 0 S22 open Bit 1 = 1 S22 closed Bit 2 = 0 S32 open Bit 2 = 1 S32 closed Bit 3 Always 0 Bit 4 = 0 S42 open Bit 4 = 1 S42 closed Bit 5 = 0 S52 open Bit 5 = 1 S52 closed Bit 6 = 0 S62 open Bit 6 = 1 S62 closed Bit 7 Always 0	The PII is only displayed when all circuits (e-stop, gate switch etc) are not closed
+ 68.0	Byte	Module_02_PII	Module_01_PII	
+ 69.0	Byte	Module_03_PII	Module_01_PII	
+ 70.0	Byte	Module_04_PII	Module_01_PII	
+ 71.0	Byte	Module_05_PII	Module_01_PII	
+ 72.0	Byte	Module_06_PII	Module_01_PII	
+ 73.0	Byte	Module_07_PII	Module_01_PII	
+ 74.0	Byte	Module_08_PII	Module_01_PII	
+ 75.0	Byte	Module_09_PII	Module_01_PII	
+ 76.0	Byte	Module_10_PII	Module_01_PII	



Section:circuit testing:

The circuit can be checked quickly using the following bit-oriented data.

Byte address	Name	Bit address								Note
		7	6	5	4	3	2	1	0	
+ 78.	Circuit_avaialbe_no.	08	07	06	05	04	03	02	01	True = available
+ 79.	Circuit_available_no.	16	15	14	13	12	11	10	09	True = available
+ 80.	Circuit_available_no					20	19	18	17	True = available
+ 82.	Circuit_closed_no.	08	07	06	05	04	03	02	01	True = closed
+ 83.	Circuit_closed_no.	16	15	14	13	12	11	10	09	True = closed
+ 84.	Circuit_closed_no.					20	19	18	17	True = closed
+ 86.	Circuit_test_no.	08	07	06	05	04	03	02	01	True = test
+ 87.	Circuit_test_no.	16	15	14	13	12	11	10	09	True = test
+ 88.	Circuit_test_no.					20	19	18	17	True = test
+ 90.	Circuit_open_no.	08	07	06	05	04	03	02	01	True = open
+ 91.	Circuit_open_no.	16	15	14	13	12	11	10	09	True = open
+ 92.	Circuit_open_no.					20	19	18	17	True = open
+ 94.	Circuit_error-no.	08	07	06	05	04	03	02	01	True = error
+ 95.	Circuit_error-no.	16	15	14	13	12	11	10	09	True = error
+ 96.	Circuit_error-no.					20	19	18	17	True = error
+ 98.	Circuit_acknowledge_no.	08	07	06	05	04	03	02	01	True = acknowledge (PQUI only)
+ 99.	Circuit_acknowledge_no.	16	15	14	13	12	11	10	09	True = acknowledge (PQUI only)
+ 100.	Circuit_acknowledge_no.					20	19	18	17	True = acknowledge (PQUI only)

PDIA 2 Driver SIMATIC S7

Example

The PDIA 2 interface module is connected to the SIMATIC S7 I/Os as described in the following table (refer also “Connection: SIMATIC S7 - PDIA 2”, page 5-5).

Connection PDIA 2	SIMATIC S7	FB PDIA 2
Od	E4.1	Data
Or	E4.0	Ready
Ic	A4.1	Clock
Is	A4.0	Strobe

E 0.7 = 1: start to read diagnostic data

E 0.6 = 1: stop reading the diagnostic data

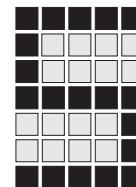
```
FUNCTION FC 1 : VOID
TITLE =Application example
VERSION : 0.0
```

```
BEGIN
SEGMENT
TITLE =form start flag
```

```
    U    E 0.7; // Start
    U(    ;
    ON    M 15.0; // pulse for start
    O    E 0.6; // no start
    )    ;
    =    M 15.3; // start reading
```

```
SEGMENT
TITLE = Get inputs from the peripherals
```

```
    L    PEB 4;
    T    MB 10; // current periphery image
```



SEGMENT

TITLE =Block call up

CALL FB 1 , DB 1 (

Data := M 10.1, // PDIA2 *Od* (from peripherals)
Ready := M 15.4, // PDIA2 *Or* (delayed by one cycle)
Start := M 15.3, // Start reading
DiagData := DB10.DBX 0.0, // Diagnostic data
Clock := A 4.1, // PDIA2 *Ic*
Strobe := A 4.0, // PDIA2 *Is*
Error := MW 12, // Error word
State := MB 14); // Status

SEGMENT

TITLE =Transfer outputs to peripherals

L AB 4;
T PAB 4;

SEGMENT

TITLE =Ready Signal from PDIA2 delayed by one cycle

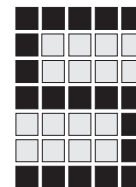
U M 10.0; // PDIA2 *Or* (from peripherals)
= M 15.4; // PDIA2 *Or* (delayed by one cycle)

NETWORK

TITLE =Edge evaluation for start

U M 14.0; // reading completed
FP M 15.1; // auxiliary flag pulse start
= M 15.0; // pulse flag start

END_FUNCTION



PDIA 2 Driver SIMATIC S7

Notes

