Allen Bradley DF1

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Allen Bradley DF1

5.10 Allen Bradley DF1

5.10.1 General Information

The operating terminals allow for a simple connection to the Allen-Bradley PLCs.
The operating terminal is connected to the interface of the respective PLC-module.
The data communication on the interface is handled by the DF1 protocol.
Communication is possible with any system implementing the DF1 protocol (e.g.: MicroLogix 1000-Series, SLC500 with SLC5/03, SLC500 with SLC5/04, PLC5 and PLC5/250).

The software components of the system are fully adapted to the parameters and marginal conditions of the PU interface.

This offers the user the following advantages:

- Random write and read access to the defined data file.
- The operating terminal automatically polls the freely definable data areas for cyclic data.
- No configuration required within the PLC.
- The PU protocol is handled entirely by the firmware of the PLC. A PLC program (function blocks, etc.) in the PLC is not required for the handling of the communication.
- The protocol provides error control. Transmission errors are detected and, if possible, eliminated by repeating the transmission.
- The parameters of the interface SER1 are assigned in the programming software in a protocol-specific manner and are stored in the Application description. Modifying of the parameters is also possible in the setup mask or each other I/O mask of the terminal at any time.
- The programming system provides a maximum of support to the operator in programming the operating terminal. The definitions (abbreviations) used here are identical with the definitions used within the PLC programm.

5.10.2 Technical Description

The interfacing of the operating terminal to the Allen-Bradley PLCs is effected in full-duplex mode.

The DF1 protocol allows random read and write access to the defined integer number file in either bit or word-mode.

Before individual bits of a word can be accessed for a write operation, a read access to the corresponding word must occur. After having modified the respective bit as desired, the word is transmitted to the PLC. Therefore, special care must be taken when accessing bits to ensure that the **terminal and the PLC** do not modify individual bits within a word at the same time.

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5.10.3 Protocol Parameters Allen Bradley

The operating terminal adapts to the default parameters of the PU-interface. It is therefore **not** necessary to modify the interface parameters in the PLC.
To ensure proper communication, the parameters must **not** be altered.

Baud rate: 300, 600, 1200, 2400, 4800, **9600**, 19200, 38400, 375000, 500000 Baud
Parity: none, **even**, odd
Data bits: 5, 6, 7, **8**
Stopbits: **1**, 1.5, 2
Handshake: **no handshake**, hardware handshake, software handshake

The default settings are printed in **bold**.

5.10.3.1 Parameter Controller Type

Allows entering of the controller type that is being used.
Interfacing is possible to a SLC500 - 5/03 and a PLC 5 only.

5.10.3.2 Parameter Block Check

The DF1 protocol permits optionally use of the block check method CRC16 or LRC8.

5.10.4 Data Type Structure

a) Alphanumerical Texts
Are stored in the memory byte for byte in ascending address order.

b) Binary Variables with a Length of 1, 2 or 4 Bytes
Data with a length of 2 bytes are interpreted in the PLC-conformal byte order for words.
Data with a length of 4 bytes are interpreted in the PLC-conformal byte order for long words.

c) Floating point numbers
The data will be interpreted in the IEEE-Floating point order.

5.10.4.1 Data Types

Interfacings to a PLC 5 permit defining of a data file number (9 to 254) for each variable in the variable list. For each data file number defined, a respective data file must be created in the PLC 5. The SLC500 CPU allows access to the data file number 9 only.

The following types of data are available for direct access:

Type	Access	Address
B	Bit	Word address
W	Word	Word address
DW	Double Word	Word address

Table 5.10-1: Data types

5.10.5 Additional Functions

In addition to the random write and read access to PLC variables, a memory area comprising 12 bytes is specified in the mask definition as poll area. The location of this memory area is specified in the mask definition.

Only marginal conditions regarding this memory area is that the PLC must be able to access in bit-mode and the terminal in word-mode, and the memory area must be contiguous. The address of this data area is defined in the application description.

The data area comprises a maximum of 6 words.

Example: The cyclic data area is set to N9:10 in the programming system

Word Address	Reference	Highbyte	Lowbyte
Word Address + 0	N9:10	Write Coordination Byte	Reserved
Word Address + 1	N9:11	Message Channel Highbyte	Message Channel Lowbyte
Word Address + 2	N9:12	Function Keys LED 1 to 4	Function Keys LED 5 to 8
Word Address + 3	N9:13	Function Keys LED 9 to 12	Function Keys LED 13 to 16
Word Address + 4	N9:14	Function Keys LED 17 to 20	Function Keys LED 21 to 24
Word Address + 5	N9:15	Function Keys LED 25 to 28	Function Keys LED 29 to 32

Table 5.10-2: Word structured poll area

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5.10.6 Physical Interfacing

Pin	Designation	Function
1	nc	not connected
2	RD	Receive Data
3	TD	Transmit Data
4	DTR	Data Terminal Ready
5	GND	Signal Ground
6	nc	not connected
7	RTS	Request To Send
8	CTS	Clear To Send
9	nc	not connected

Table 5.10-3: Pin assignment X2 RS232

Pin	Designation	Function
6	TD	Transmit Data
15	CTS	Clear To Send
17	RTS	Request To Send
18	RD	Receive Data
25	SGND	Signal Ground

Table 5.10-4: Pin assignment universal interface SER1 RS232

Pin	Designation	Function
1	Shield	Shielding
2	T(A)	Transmit Data, Channel A
3	R(A)	Receive Data, Channel A
4	RTS(A)	Request To Send, Channel A
5	CTS(A)	Clear To Send, Channel A
6	nc	not connected
7	nc	not connected
8	SG	Signal Ground
9	T(B)	Transmit Data, Channel B
10	R(B)	Receive Data, Channel B
11	RTS(B)	Request To Send, Channel B
12	CTS(B)	Clear To Send, Channel B
13	nc	not connected
14	nc	not connected
15	nc	not connected

Table 5.10-5: Pin assignment X2 RS485

Pin	Designation	Function
8	T(A)	Transmit Data, Channel A
9	T(B)	Transmit Data, Channel B
11	SGND	Signal Ground
22	R(A)	Receive Data, Channel A
23	R(B)	Receive Data, Channel B

Table 5.10-6: Pin assignment universal interface SER1 RS485

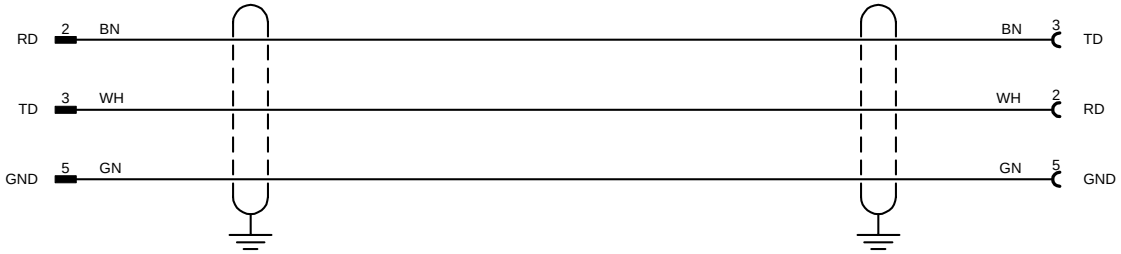
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5.10.6.1 Connecting Cable RS232 - Allen Bradley SLC500

The following wiring diagram does not apply to terminals with universal interface.

TesiMod
Operating Terminal

Allen Bradley
SLC500-5/03



D-Subminiatur
Male Connector
9-pin

D-Subminiatur
Female Connector
9-pin

Each end of the shield is connected to the metallic enclosure.

5.10.6.2 Connecting Cable Universal Interface SER1 RS232 - Allen Bradley SLC500

The following wiring diagram applies to terminals with universal interface only.

TesiMod
Operating Terminal

Allen Bradley
SLC500-5/03



D-Subminiatur
Male Connector
25-pin

D-Subminiatur
Female Connector
9-pin

Each end of the shield is connected to the metallic enclosure.

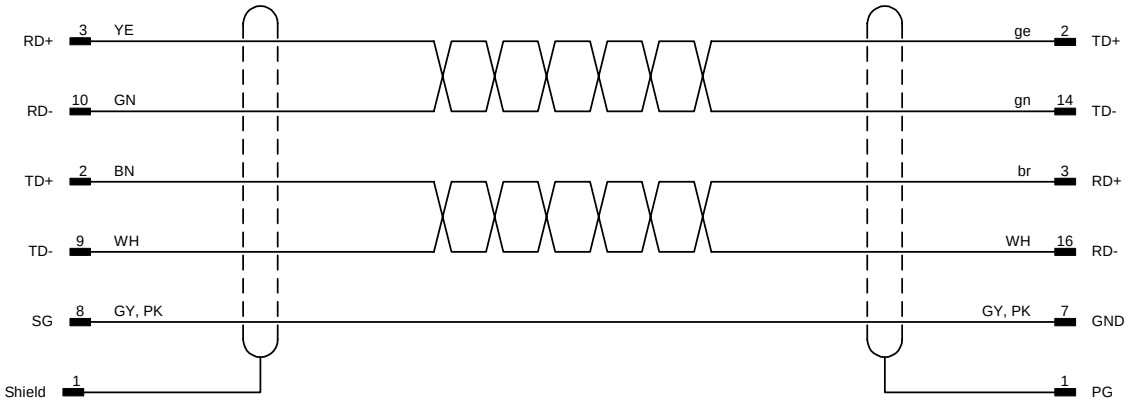
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5.10.6.3 Connecting Cable RS485 - Allen Bradley PLC5

The following wiring diagram does not apply to terminals with universal interface.

TesiMod
Operating Terminal

Allen Bradley
PLC5 Channel 0



D-Subminiatur
Male Connector
15-pin

D-Subminiatur
Male Connector
25-pin

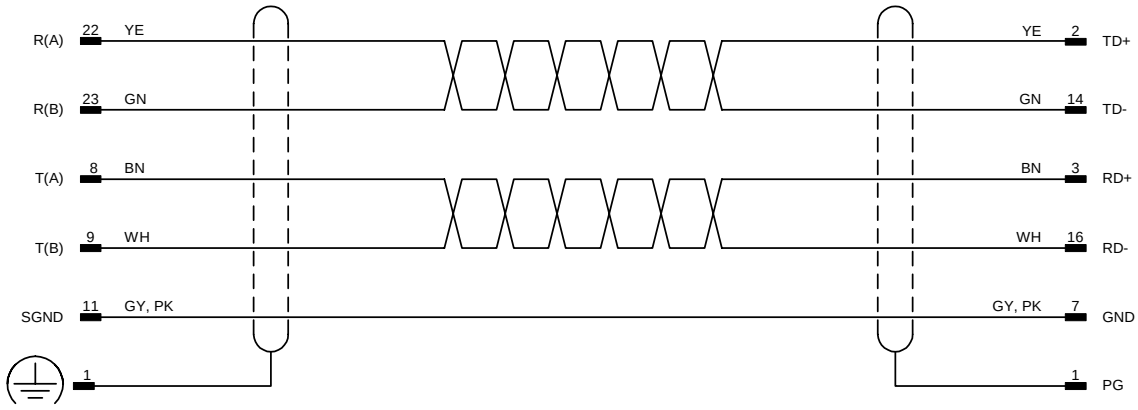
Each end of the shield is connected to the metallic enclosure.

5.10.6.4 Connecting Cable Universal Interface SER1 RS485 - Allen Bradley PLC5

The following wiring diagram applies to terminals with universal interface only.

TesiMod
Operating Terminal

Allen Bradley
PLC5 Channel 0



D-Subminiatur
Male Connector
25-pin

D-Subminiatur
Male Connector
25-pin

Each end of the shield is connected to the metallic enclosure.

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5.10.7 Error Messages

Code 0
Subcode
0

Code 1
Subcode

1	E_SLAVE_NOT_READY	Slave not ready
2	E_PROTOKOL	Sequence of the packets
3	E_FRAME	Character frame error
4	E_TIMEOUT	Timeout error
5	E_CRC_BCC	CRC error
6	E_PARITY	Parity error
7	E_SEND_ABORT	Abort send process
8	E_REC_ABORT	Abort receive process
9	E_BUF_SIZE	Insufficient cyclic buffer
10	E_NO_DEFINE	No cyclic data defined
12	E_DEFINE	Cyclic data already defined
15	E_NO_PROTOCOL	Selected protocol is not supported
16	E_OVERRUN	Receive buffer overrun
40	E_SYS_ADDRESS	Undefined system variable
50	E_QUIT_DATA	No acknowledge signal to order message
51	E_QUIT_DATA_NAK	Negative acknowledge signal to order message
52	E_WRONG_QUIT	Incorrect character for acknowledge signal
53	E_WRONG_REPLY	Reply can not be interpreted
54	E_TIMEOUT_ORDER	Timeout no response message
56	E_TIMEOUT_REPLY	Timeout no response message

Code 2
Subcode
58 E_RECEIVE_COUNT ..... Number of received data is incorrect

Possible errors:
- Check if in the mask where the error occurs
  a variable with odd number of bytes will be read by a word or double-word address.

Code 3 Error from the PLC
Subcode
10 Error in the order message
50 Access on address in the PLC that is not permitted

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