SIEMENS

9725

DESIGO™ I/O–OPEN

SED1 Solution PTE-ASED.20

For the integration of the Siemens SED1 variable speed drives

The interface module allows communication between the Siemens SED1, MICRO, and MIDIMASTER VSD range Variable Speed Drives (VSD) and the Siemens building automation and control systems UNIGYR and VISONIK.
Connecting up to two VSD units.

Use

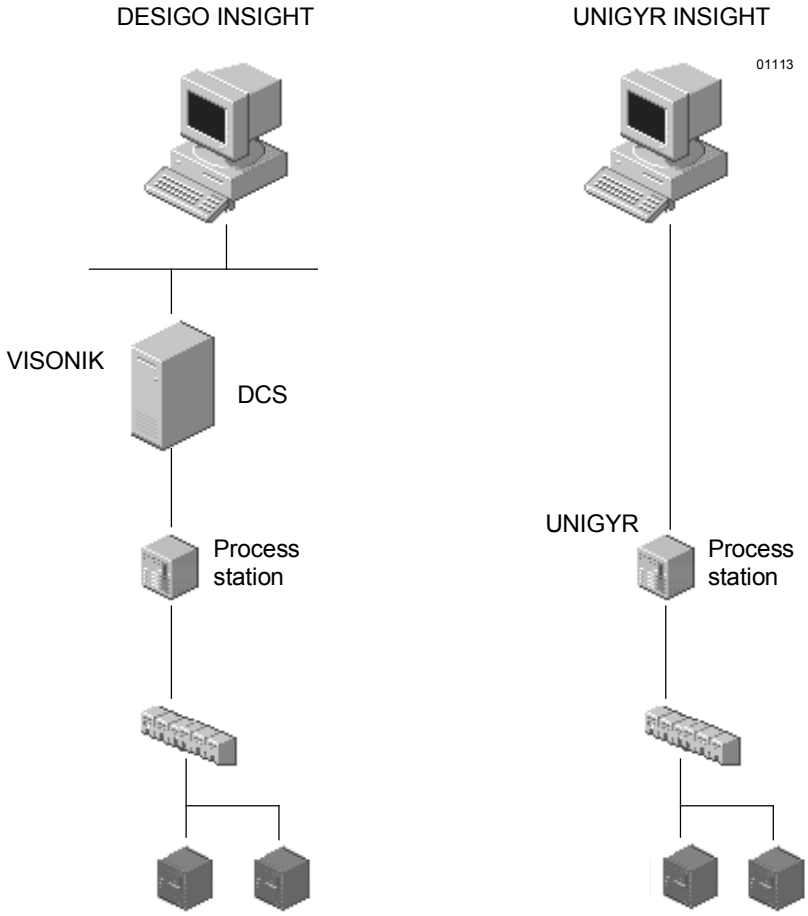
With the interface module, up to two VSD units can be integrated into all UNIGYR-EMS or UNIGYR-VISONIK process units with a P-bus connection (PRU2, PRU10, PRS10, RMP30, RWM82) or into the BPS process units (PRV2).

Functions

The interface module provides the following functionality for each variable speed drive:

- General control: on/off and frequency setpoint
- Operating parameter feedback: rpm, current, voltage and actual frequency
- Fault: indication and acknowledgement

System topology



SED1 Micromaster/Midimaster Eco Drives

Compatible VSD units

The tables below show the types of Siemens variable speed drives that can be integrated using the PTE-ASED.20 interface module:

208 to 240V ± 10% 3-phase			525 to 575V ± 10% 3-phase		
SED type	**Siemens type**	**kW**	**SED type**	**Siemens type**	**kW**
SED1-0.75/..	ECO1-75/2	0.75	SED1-4/4..	ECO1-400/4	4
SED1-1.1/2..	ECO1-110/2	1.1	¡ED1-5.5/4..	ECO1-550/4	5.5
SED1-1.5/2..	ECO1-150/2	1.5	SED1-7.5/4..	ECO1-750/4	7.5
SED1-2.2/2..	ECO1-220/2	2.2	¡ED1-11/4..	ECO1-1100/4	11
SED1-3/2..	ECO1-300/2	3	SED1-15/4..	ECO1-1500/4	15
SED1-4/2..	ECO1-400/2	4	¡ED1-18.5/4..	ECO1-1850/4	18.5
SED1-5.5/2..	ECO1-550/2	5.5	SED1-22/4..	ECO1-2200/4	22
SED1-7.5/2..	ECO1-750/2	7.5	¡ED1-30/4..	ECO1-3000/4	30
SED1-11/2..	ECO1-1100/2	11	SED1-37/4..	ECO1-3700/4	37
SED1-15/2..	ECO1-1500/2	15	¡ED1-45/4..	ECO1-4500/4	45
SED1-18.5/2..	ECO1-1850/2	18.5			
SED1-22/2..	ECO1-2200/2	22			
SED1-30/2..	ECO1-3000/2	30			
SED1-37/2..	ECO1-3700/2	37			
SED1-45/2..	ECO1-150/14	45			

380 to 500V ± 10% 3-phase		
SED type	**Siemens type**	**kW**
SED1-1.1/3..	ECO1-110/3	1.1
SED1-1.5/3..	ECO1-150/3	1.5
SED1-2.2/3..	ECO1-220/3	2.2
SED1-3/3..	ECO1-300/3	3
SED1-4/3..	ECO1-400/3	4
SED1-5.5/3..	ECO1-550/3	5.5
SED1-7.5/3..	ECO1-750/3	7.5
SED1-11/3..	ECO1-1100/3	11
SED1-15/3..	ECO1-1500/3	15
SED1-18.5/3..	ECO1-1850/3	18.5
SED1-22/3..	ECO1-2200/3	22
SED1-30/3..	ECO1-3000/3	30
SED1-37/3..	ECO1-3700/3	37
SED1-45/3..	ECO1-4500/3	45
SED1-55/3..	ECO1-5500/3	55
SED1-75/3..	ECO1-7500/3	75
SED1-90/3..	ECO1-9000/3	90
SED1-110K/3..	ECO1-110/K3	110
SED1-132K/3..	ECO1-132/K3	132
SED1-160K/3..	ECO1-160/K3	160
SED1-200K/3..	ECO1-200/K3	200
SED1-250K/3..	ECO1-250/K3	250
SED1-315K/3..	ECO1-315/K3	315

VSD unit data point types

The table below shows the data point types of the VSD units which can be integrated using the interface module:

Data point name	Range	**Data point type**	**Data flow**
Drive On/Off	0 / 1	DO	S → VSD
Fault acknowledgement	0 / 1	DO	S → VSD
Drive frequency setpoint	0 - 75 Hz	AO	S → VSD
Number of drives	0,1 or 2	AO	internal
Nominal motor speed, rev/min	0 - 9999 rev/min	AI	VSD → S
Drive output voltage	0 - 1000 V	AI	VSD → S
Drive output current	0 - 300 A	AI	VSD → S
Drive running	0 / 1	AI	VSD → S
Frequency	0 - 75 Hz	AI	VSD → S
Fault indication	0 / 1	AI	VSD → S
Most recent fault code	0 - 255	AI	VSD → S

Direction of data flow

VSD → S indicates VSD to SYSTEM
S → VSD indicates SYSTEM to VSD

Access

This data can be accessed:
Locally at the VSD unit.
Centrally via the PC user interface

Functions relating to the application	The interface module consists of a combination of consecutive virtual I/O-modules, which are individually addressable, starting from a base address. The VSD unit data points are mapped internally in the interface module to normal I/O points, which can then be integrated into the process units. Communication between a VSD unit and the process unit serves to link the key data of the VSD unit, which can be centrally interrogated and set via the building management system.
Display functions on the interface module	The interface module incorporates two LEDs to indicate communications consistency.
Operational safety	All safety and precautionary measures in relation to function and system safety are detailed under “Technical design”.

Type summary

Ordering	The I/O OPEN SED1 Solution interface module should be ordered from Logistics, under the ASN number **PTE-ASED.20**
Delivery	The base and the electronic module are delivered together, in separate but linked packaging.
Accessories	Refer to data sheet CM2N8105 for general I/O accessories, which must be ordered separately.

Compatibility

Process units	The interface module can be connected to those Siemens Building Technologies process units which have a P-bus connection, and which, in terms of software, support the required functions for the special module types. Currently, the only process units supporting these special module types are UNIGYR process units with a P-bus connection, and the BPS.
VSD units	The interface module is used with the VSD units Siemens SED1, MICRO, and MIDIMASTER, all of which use the Siemens Universal Serial Protocol (USS). Refer to the table under “Functions”.

Technical design

General	The interface module enables VSD unit data points to be mapped to the P-bus, so that the process units is able to read each data point via assigned addresses and channels. The module periodically reads the data points from the VSD unit and updates its internal database with the actual values. Upon read requests from the process units, the data point values are transferred from the interface module to the process units. In the opposite direction, values written from the process units to the interface module over the P-bus are transferred to the VSD unit.
Generating a program	In terms of function, the interface module contains 11 I/O module addresses (2 x 2Q250, 2 x 2Y10 and 7 x 2R1K), which are “virtual”, meaning they do not exist as physical individual modules. The sixteenth module address is left vacant; this address is used for module production tests. The VSD unit values and attributes from these module addresses must be re-scaled and decoded as described further below.

Data traffic

P-bus

Data traffic between the interface module and the process units takes place on the 3-wire P–bus (process bus). Refer to data sheet CM2N8022, “Process Bus” for detailed information.

USS protocol via RS485

The data traffic between the interface module and the VSD unit bus is carried out in accordance with the USS protocol requirements. For more detailed information refer to Siemens Universal Serial Protocol (USS) documentation.

Addressing

For the transfer of data on the P-bus, an address is assigned to each data point. This P-bus address consists of:

- a base address
- an offset address, and
- a channel number

Process unit data point addressing

The table below shows the data point addressing for a process unit*:*

Digital outputs	Analogue outputs	Analogue inputs	Analogue inputs
00	01	02	03
Drive On/Off 1 I 0 Drive nr *Telegram bit*	**Drive frequency setpoint** 5 I 0 Drive nr *Telegram field*	**Nominal motor speed (RPM)** 9 I 0 Drive nr *Parameter 135*	**Frequency** 13 I 0 Drive nr *Telegram field*
Drive On/Off II 1 Drive nr *Telegram bit*	**Drive frequency setpoint** II 1 Drive nr *Telegram field*	**Nominal motor speed (RPM)** II 1 Drive nr *Parameter 135*	**Frequency** II 1 Drive nr *Telegram field*
2Q250	2Y10	2R1K	2R1K
Fault Acknowledgement 2 I 2 Drive nr *Telegram bit*	**Number of drives** 6 I 2 1 or 2, (2 = default) *Internal parameter*	**Drive output voltage** 10 I 2 Drive nr *Parameter 137*	**Fault indication** 14 I 2 Drive nr *Telegram bit*
Fault Acknowledgement II 3 Drive nr *Telegram bit*	**Not used** II 3	**Drive output voltage** II 3 Drive nr *Parameter 137*	**Fault indication** II 3 Drive nr *Telegram bit*
2Q250	2Y10	2R1K	2R1K
3 I 4	7 I 4	**Drive output current** 11 I 4 Drive nr *Parameter 132*	**Most recent fault code** 15 I 4 Drive nr *Parameter 140*
II 5	II 5	**Drive output current** II 5 Drive nr *Parameter 132*	**Most recent fault code** II 5 Drive nr *Parameter 140*
		2R1K	2R1K
4 I 6	8 I 6	**Drive running** 12 I 6 Drive nr *Telegram bit*	16 I 6 **Reserved for testing**
II 7	II 7	**Drive running** II 7 Drive nr *Telegram bit*	**Reserved for testing** II 7
		2R1K	Module info

The interface module is assigned a base address by means of an address plug (hardware address). Fixed offset addresses are used in the interface module. The address plug must be selected so that the first module address in the interface module corresponds to a base address. Base addresses have the values 1, 5, 9, 13, 17 etc. to 109 (decimal). For this interface module, however, only addresses up to 97 can be used.

Addressing plug 97 is the highest address which can be used to enable all data points in the interface module to be addressed on the P-bus.

Example:
An interface module with addressing plug 9 is shown on the P-bus as follows:

$02	SB	59	9:	2Q250	10:	2Q250	11:	--	12:	--
$03	STU	59	13:	2Y10	14:	2Y10	15:	--	16:	--
$04	MW	56	17:	2R1K	18:	2R1K	19:	2R1K	20:	2R1K
$05	MW	56	21:	2R1K	22:	2R1K	23:	2R1K	24:	--

Base address	$ADR for VSD unit output current
9 ($02)	$(02+2)+3 = **$43**

It is important to note that the number of load units must not be exceeded in a process unit. The **PTE-ASED.20** module occupies 13 load units in the BPS and 13 in the PRU.

Scaling parameters for VISONIK

The table below shows the scaling parameters that have to be entered in VISONIK to allow for optimum scaling of the input and output values.

Data point description	**Data point type**	**Address (Base +)**	**COF (Offset)**	**CS (Slope)**
Drive On/Off	DO	0		
Fault acknowledgement	DO	1		
Drive frequency setpoint	AO	4	0	0.5
Number of drives	AO	5	0	0.5
Nominal motor speed, rev/min	AI	8	-120	2.5
Drive output voltage	AI	9	-12	0.25
Drive output current	AI	10	-3.6	0.075
Drive running	AI	11	-9.6	0.2
Frequency	AI	12	-0.96	0.02
Fault indication	AI	13	-9.6	0.2
Most recent fault code	AI	14	-9.6	0.2

(COF and CS are Conversion Parameter Set (CVP) variables in VISONIK)
COF = Conversion Offset; CS = Conversion Slope

Each address has two channels. Channel 1 is routed to VSD unit 1 and channel 2 to VSD unit 2. When 'Number of drives' is 1, only the drive with slave address 1 is interfaced.

The different CVP sets can be generated with the command: Gen @CVP1 (e.g. for Set1). An analogue point can be connected to a CVP set by setting the correct CVP number in the CPNR parameter of an analogue point. Refer to the VISONIK manuals for details.

Function parameters and function blocks for UNIGYR

The table below shows the function block parameters and additional function blocks that have to be entered in UNIGYR to allow for optimum scaling of the input and output values.

Data point description	Data point type	Address (Base +)	Offset parameter	Slope parameter
Drive On/Off	DO	0		
Fault acknowledgement	DO	1		
Drive frequency setpoint	AO	4	*	*
Number of drives	AO	5		
Nominal motor speed, rev/min	AI	8	-120	2.5
Drive output voltage	AI	9	-12	0.25
Drive output current	AI	10	-3.6	0.075
Drive running	AI	11	-9.6	0.2
Frequency	AI	12	-0.96	0.02
Fault indication	AI	13	-9.6	0.2
Most recent fault code	AI	14	-9.6	0.2

* For scaling of the frequency setpoint value a 'FormBl' function block must be created. The settings of this function block are as follows:

Operand A = Frequency setpoint (entered by the user/system)
Result = A*50/60 (linked to the output value of the 2Y10 module)

The analogue input points from the 2R1K modules can be scaled using the point's own parameters (offset and slope). Refer to the UNIGYR engineering manuals.

Interface module LEDs for P-bus and USS protocol on RS485

The two LEDs for the P-bus and the USS protocol on RS485 indicate the operational status of the interface module and that of the USS bus connections.

The table below provides the relevant information:

Phase	P-bus LED 1	RS485 LED 2	Meaning
Start phase (approx. 5s)	Steady light		Normal status
	Off		No P-bus module power supply
	Flashing light		Module faulty
During operation	Steady light	Steady light	Normal operation
	Steady light	Flashing light	Transmission error between module and RS485 bus
	Off	Off	No P-bus module power supply or no AC 24V operating voltage
	Steady light	Off	No communication with RS485

System and functional safety

Power-up response	When the power supply is switched on (reference voltage BEZ and system potential G), the interface module is capable of communicating (i.e. ready to receive data) within 0.5 seconds.
Transmission reliability	• Faulty data transmission is detected and the data is not accepted. Transmission reliability is ensured by use of a cyclic redundancy check (CRC). • A process units must transmit updated output values in the form of an error-free telegram at 4-second intervals to the interface module. If no telegram is received within the specified period, the interface module's default values are activated and transmitted to the process units instead of the non-transmitted actual values.
Protection from faulty wiring	The interface module will not be damaged if an AC 230 V supply is accidentally connected to the process units or RS485 bus.
Short-circuit resistance	The two bus lines are short-circuit proof.
Working on the module when connected	Connection to the VSD unit bus, or plugging in and removal of the interface module under voltage will not cause any damage to the module.
Note	The full functional scope of the interface module covers not only the module itself (hardware) but also the handling of the signals in the process units (software). For a full understanding of the functional scope of the module, the relevant process sequences must be taken into consideration. For technical features common to all I/O modules, refer to documentation CM2Z8102, "Basic data of I/O module system".

Mechanical design

The interface module has a plastic housing incorporating the terminal base and electronic assembly. The module can be plugged onto the I/O bar, with signal and voltage pick-off via contact springs on a conductor rail in the I/O bar.

The connecting terminals for the interface module, arranged on the I/O bar, fulfil the function of a terminal block. Terminal blocks must normally be installed in the control panel for external wiring. They meet all the relevant standards and guidelines, include test terminal functions and can be labelled specifically for the plant.

The module has a transparent front cover for insertion of plant-specific module labels. These can be pre-printed on perforated labelling sheets with the configuration tool "UNIGYR Design".

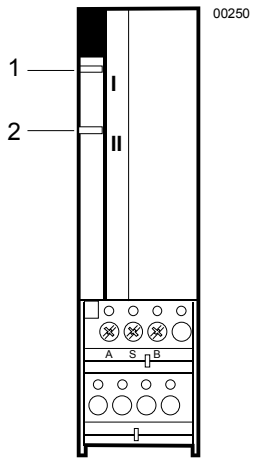
The address plug and the two LEDs for the P-bus and USS interface are located on the front of the module. There are no operator controls.

Note

The necessary interface module accessories are listed in data sheet CM2N8105. Refer to documentation CM2Z8102 "Basic Data of I/O Module System" for a detailed description of the module's mechanical design.

Front view

PTE.ASED.20



1 - LED for the P-bus

2 - LED for RS485 interface

Engineering notes

The documentation CM2Z8102, “Basic Data of I/O Module System”, contains system-related engineering information. Please consult this sheet, with special attention to the safety information, before reading the following.

Appropriate use

Within the overall system, the interface module must always be used in applications as described in the documentation CM2Z8102, “Basic Data of I/O Module System”. The specific features of the interface module given in the brief description on the front page and in the “Use”, “Engineering notes” and “Technical data” sections must be taken into consideration.

Interface the VSD unit bus

The VSD unit bus is electrically isolated from the interface module electronics.

System integration

The interface module represents a combination of consecutive virtual I/O-modules, which can be addressed individually, starting from a base address. The process units data points are mapped internally in the interface module to normal I/O points, which can then be integrated into the process units.

System Setup parameters and default values

Inside the I/O-OPEN SED1 Solution interface module, the parameters/defaults are as follows:

Data point description	Data point type	Address (Base +)	Default value
Drive On/Off	DO	0	0 (=Off)
Fault acknowledgement	DO	1	0 (=Off)
Drive frequency setpoint	AO	4	0 Hz
Number of drives	AO	5	0 (= 2 VSD)

Note

The internal parameter ‘**Number of drives**’ is used to configure the PTE-ASED.20 optimally for use with either one or two VSD units. The default value is 0, meaning two drives are interfaced. Setting the value to “1” will cause the interface to scan only VSD unit slave address 1.

System integration for UNIGYR-VISONIK

The integration of the VSD units into UNIGYR-VISONIK through an I/O-OPEN SED1 interface module simply involves entering the correct configuration with the VISOTOOL. For correct scaling, six CVP sets have to be created as described earlier in this document (refer to the table under “Scaling parameters for VISONIK”).

System integration for UNIGYR-EMS

The integration of the VSD units into UNIGYR-EMS through an I/O-OPEN SED1 interface module simply involves entering the correct configuration, using UNIGYR Design. For correct scaling, two additional function blocks (FormBl) have to be created for the 2Y10 module, which represents the frequency setpoint. The analogue inputs can be scaled by making use of the point’s own parameters (offset and slope). Refer to the table under “Function parameters and function blocks for UNIGYR”.

UNIGYR version compatibility

The I/O-OPEN SED1 Solution interface module is compatible with UNIGYR Version 7 and below. If the user wants to use the interface they must adapt the `TOOL.PRF` file. The user must incorporate the following modifications (additional text shown in **bold**):

1. Description of the module in section [IOCOMPACT]
   [IOCOMPACT]
   Variants=PTK1.30V01;PTK1.23V02;PTM52.32;PTM50.32;DH_COMPACT**;PTE-ASED.20**

2. Define new section [**PTE-ASED.20**]
   [PTE-ASED.20]
   ;* definition of a Siemens VSD-Drive coupling module**
   HWTypeId=20
   PowerUse=8
   ;ModuleSet=2 PTM1_2Q250; 2 PTM1_2Y10; 7 PTM1_2R1K
   ModuleSet=1951;1951;0;0;1955;1955;0;01913;1913;1913;1913;1913;1913;1913

Mounting notes

Refer to the following documentation for mounting instructions:

- Documentation CM2Z8102, “I/O Module System”
- Documentation CM2M8102, “I/O-Module and P-bus”, for the application of the I/O module in connection with UNIGYR.
- “VISONIK Mounting and Installation Handbook Building Process Station BPS” (CM2M8017E) for the use of the I/O module in conjunction with VISONIK.

Instructions for fitting the I/O module on mounting rails and on the I/O bar are printed on the packaging.

Commissioning notes

VSD unit parameter setup

For correct operation, specific parameters need to be configured for the VSD unit to be integrated via the interface module.

All parameters should first be set to the factory default. This can be done by setting parameter 944 to 1. After that, the specific plant parameters can be set. Setting parameter 199 to 1 allows full control of all parameters. The parameters that need to be configured specifically for the I/O-OPEN SED1 interface modules are:

Parameter number	Parameter description	Value	Meaning
910	Remote / Local mode	1	Full remote access
91	Slave address	1 or 2	Depends on the VSD number
92	Serial baud rate	6	9600 baud
93	**Serial line time-out**	**0 - 240**	**Additional security measure***
94	Nominal system setpoint	50	50 Hz corresponds to 100%
95	USS compatibility	0	Compatible with 0.1 Hz resolution

* The 'Serial line time-out' parameter can be used to switch off the VSD unit when no valid telegram is received within the predefined time (0 to 240 s).

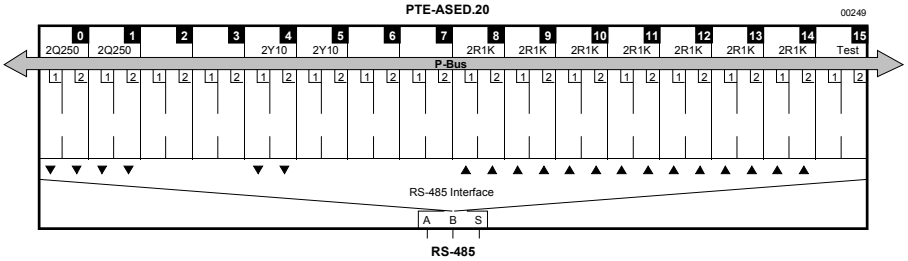
Guidelines for setting the parameters can be found in the operating instructions and reference manual for the variable speed drive.

Technical data

Power supply	Operating voltage	AC 24 V ± 20%
	Low voltage (SELV)	To EN 60 730
	Frequency	50 Hz / 60 Hz
	Power consumption	2VA
	I/O module power supply via P-bus	DC 24 V (against G0)
	Load units	13 load units occupied
Module addresses	Number range for base addresses	1 to 97
	Valid offset addresses	0 to 15
P-bus	See document CM2N8022 "Process Bus"	
RS485 interface	Interface type	RS-485 (electrically isolated)
	Transmission speed	9600 bps
	Data bits	8 bits
	Stop bits	1
	Parity	Even
	Type of cable	Screened, twisted two-core cable, Class 1 60/75°C (UL compliance)
	Maximum cable length	1200 m
	Diameter	2 x 0.5mm²
Conformity	Meets the requirements for CE marking:	
	EMC Directive	89/336/EEC

Note For technical data applicable to all I/O modules, refer to documentation CM2Z8102 "Basic Data of I/O Module system".

Internal diagram



Addressing:

0…15 Offset addresses (black squares).
1…2 Channel addresses within offset addresses (white squares).
(Assigning data points to the respective module types: refer to the table under “Data point addressing for the BPS”).

RS485 interface:

A Positive Transmit/Receive
B Negative Transmit/Receive
S Ground

Relative address 15 is used for the system test during production.

Connecting the interface module to the VSD bus

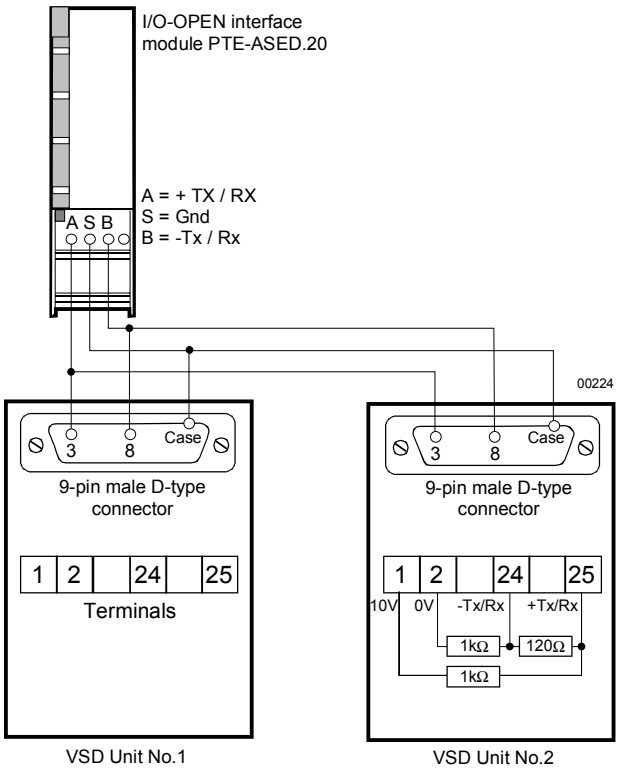
The SED1, MICRO and MIDIMASTER ECO have a three-wire RS485 interface with two signal lines and a protective earth signal. If the VSD unit has a four-wire connection, the positive *Receive* and the positive *Transmit* must be connected together on the drive, as must the negative *Receive* and negative *Transmit*. In a bus configuration, the positive wire (A), the negative wire (B) and the protective earth (S) have to be connected to the respective terminals on each VSD unit.

In order to reduce noise from the module to the VSD unit on the serial link, it is advisable to tie the positive (A) and negative line (B) to 10V and 0V respectively on the **last VSD unit** in the chain. This can be achieved by connecting a 1k Ω resistor between 10V and +Tx/Rx (A) and a 1k Ω resistor between 0V and −Tx/Rx (B). Additionally, a 120 Ω resistor should be connected between lines A & B.

There are two possible connection configurations:

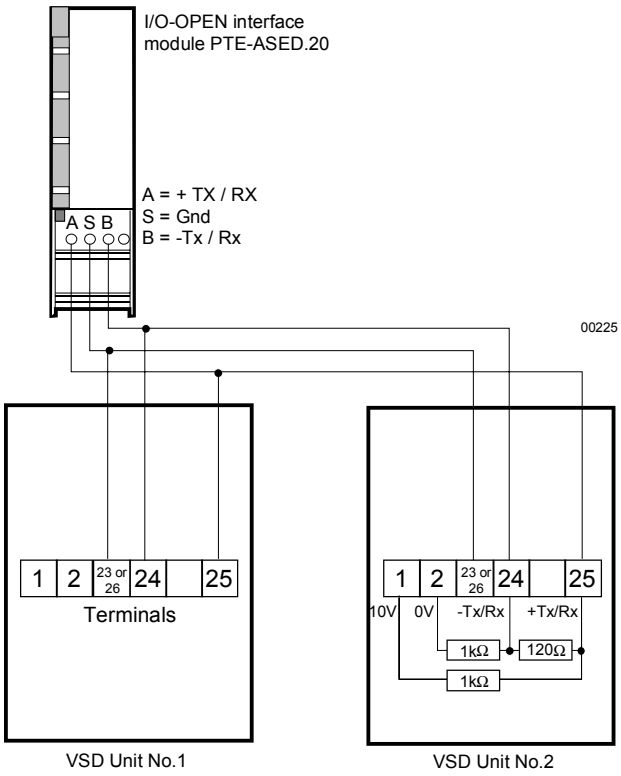
Configuration 1
VSD unit DB9 connection

When the front DB 9 interface on the drive is used, the resister network can be implemented using the terminals illustrated below:



Configuration 2
VSD unit terminal connection

When connecting the PTE-ASED.20 directly to the VSD unit's terminals, the following configuration must be used:



Warning!

Note that the **simultaneous use of the PTE-ASED.20 and the OPE is not allowed** in this configuration.

Also **check the terminal number in the reference manual** for connecting the ground signal (S) to the **PE terminal** on the VSD units (23 for the MICROMASTER and 26 for the MIDIMASTER range).

Dimensions

Dimensions in mm