



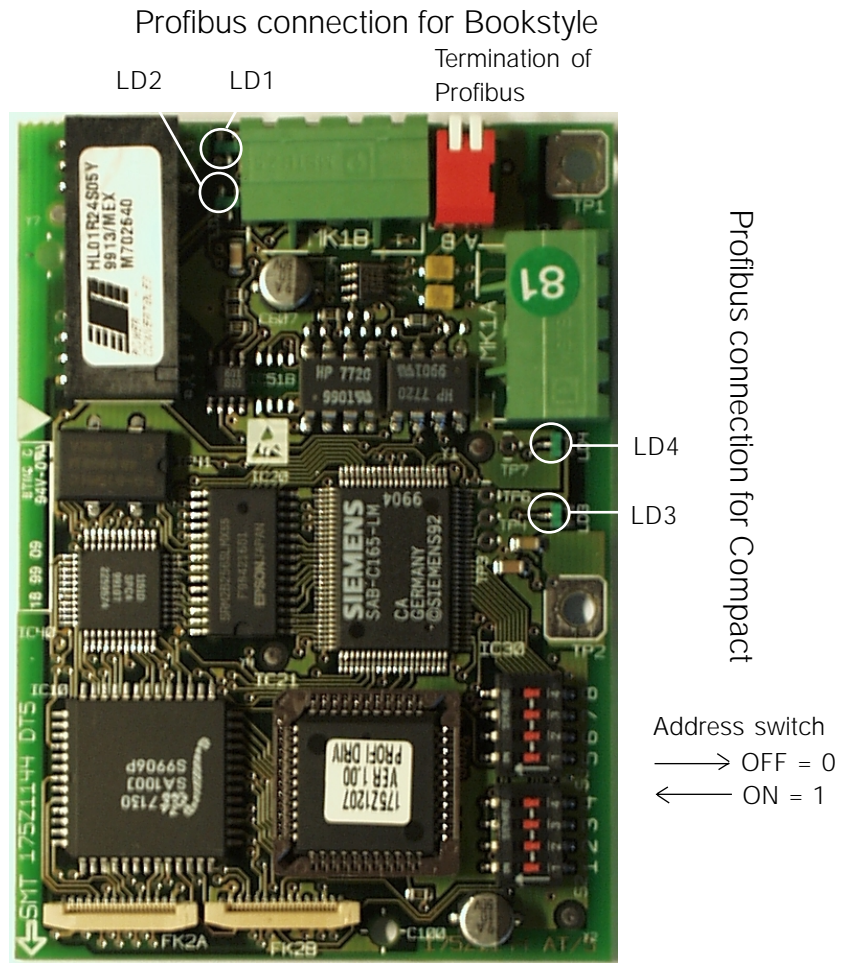
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## High Performance FieldBus cards

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Profibus card VLT 5000/6000 .....	2
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■ Old Profibus card VLT 5000/6000



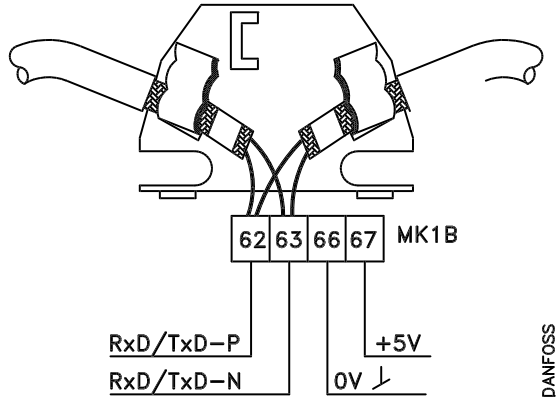
■ New Profibus card VLT 5000/6000

The new Profibus card is only available as built-in from Danfoss Drives.



## Profibus data

### ■ Profibus connection



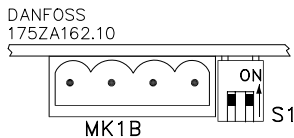
### ■ Cable specification

- Impedance: 135 to 165 ohm at a measuring frequency from 3 to 20 MHz
- Resistance: < 110 ohm/km
- Capacitance: < 30 pF/m
- Damping: max. 9 dB over the whole wire length
- Cross section: max. 0.34 mm<sup>2</sup>, corresponding to AWG 22
- Cable type: twisted in pairs, 1 x 2, or 2 x 2, or 1 x 4 wires
- Screening: Copper-braided screen or braided screen and foil screen

It is recommended to use the same cable type in the entire network to avoid impedance mismatch.

### ■ Profibus termination

By 'ON' is the bus termination active.



### ■ Technical data

Baudrate ..... 9.6 - 12000 kBaud  
 Address area ..... 1 - 126

### ■ LEDs

There are 4 LEDs on the PROFIBUS option card:  
 LD1 and LD4: Flashes when the card is communicating.  
 LD2 and LD3: Lights up when the card is initialized and ready to communicate. They will flash while auto baudrate detection is attempting to detect the actual baudrate.

### ■ Profibus instructions

Siemens S7 PLC ..... MC.50.A1.02  
 Siemens S5 IM 308C ..... MC.50.C1.02  
 SST-PFB-PLC5 Profibus master ..... MN.51.U1.02  
 GE Fanuc Series 90-30 ..... MI.50.X1.02

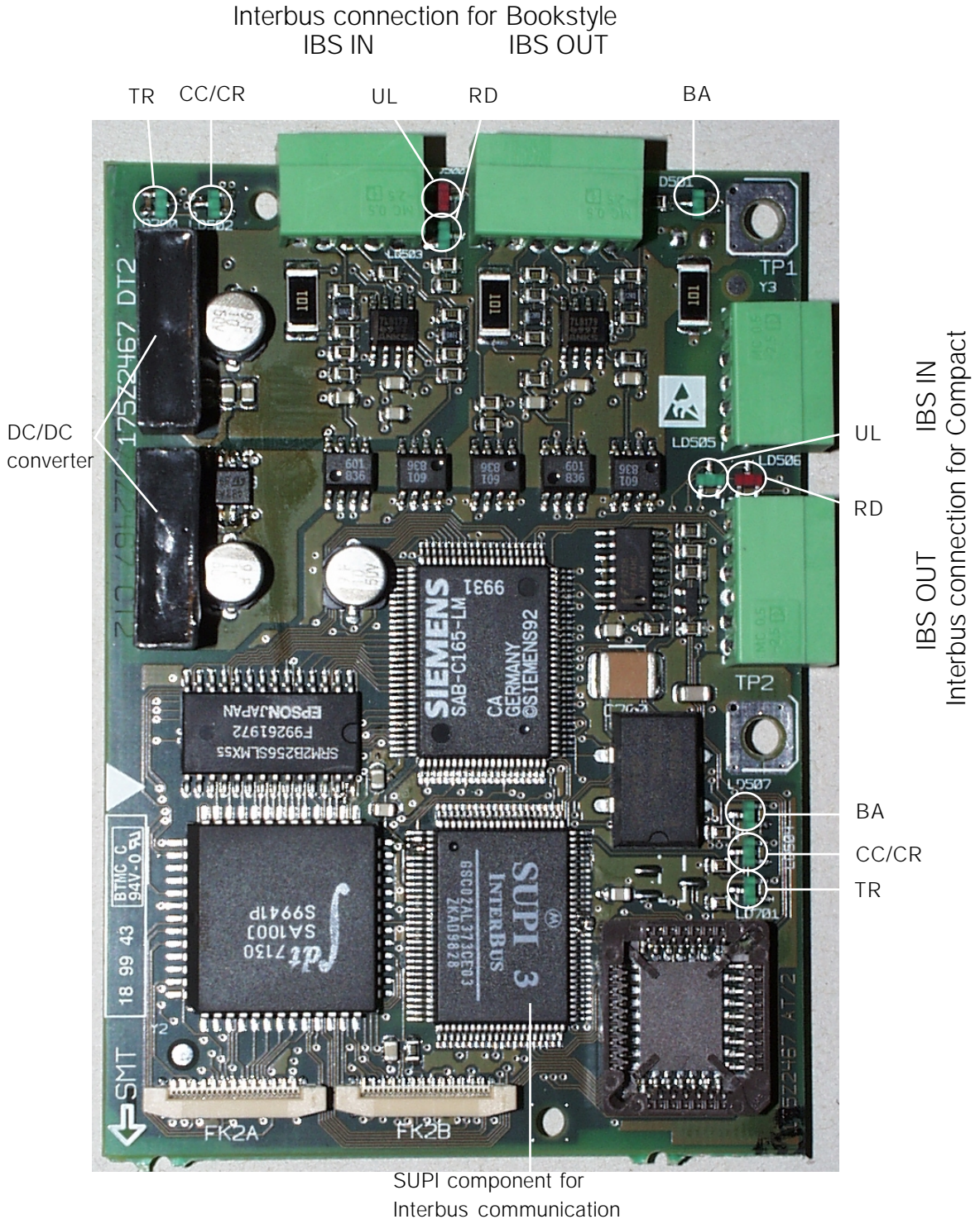
All instructions are available on Danfoss Drives intranet.

### ■ Cable length

Transmission speed	Max. total cable length [m]
9.6 - 187.5 kBaud	1000
500 kBaud	400
1.5 MBaud	200
3-12 MBaud	100

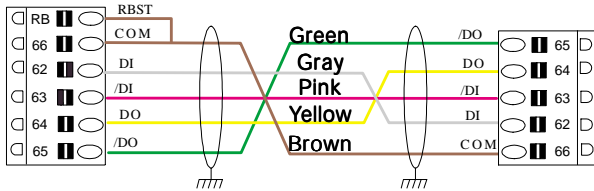
Note that these cable lengths are for 1 segment with 31 VLT frequency converter.  
 See manual MG.50.E4.xx for cable length with more segments.

■ Interbus card VLT 5000

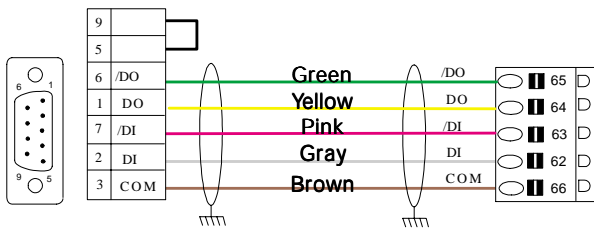


### Interbus data

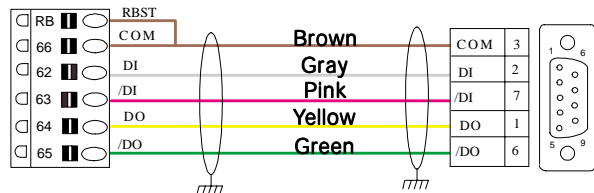
#### ■ Interbus connection



VLT 5000 to VLT 5000



DB9 (male) to VLT 5000



VLT 5000 to DB9 (female)

#### ■ Cable length

Max. total cable length ..... 12.8 km (Cu)

Max. length between nodes ..... 400 m

#### ■ Cable specification

- Impedance: 135 to 165 ohm at a measuring frequency from 3 to 20 MHz
- Resistance: < 110 ohm/km
- Capacitance: < 30 pF/m
- Damping: max. 9 dB over the whole wire length
- Cross section: max. 0.34 mm<sup>2</sup>, corresponding to AWG 22
- Cable type: twisted in pairs, 3 x 2 wires
- Screening: Copper-braided screen or braided screen and foil screen

It is recommended to use the same cable type in the entire network to avoid impedance mismatch.

#### ■ Technical data

Baudrate ..... 500 kBaud

#### ■ LEDs

Name	Indicates	Color	On	OFF
CC/CR:	Cable Check.	Green	Incomming bus active	Incomming bus swiched off
BA	Bus Active.	Green	Bus active	Bus stopped
RD:	Status of outgoing bus.	Red	Outgoing bus stopped	Outgoing bus active
TR:	Transmit/Receive.	Green	PCP Communication running	NO PCP Communication running
UL:	Power OK.	Green	Voltage within permissable range	No Voltage

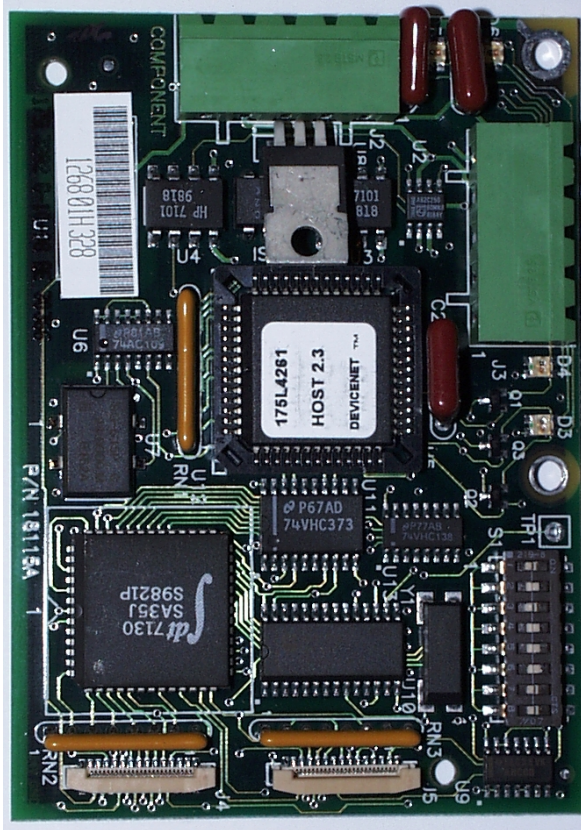
#### ■ Interbus instruction

Interbus CMD ..... MN.50.U1.02

The Interbus instruction is available on Danfoss Drives intranet.

■ DeviceNet card VLT 5000

DeviceNet connection for Bookstyle

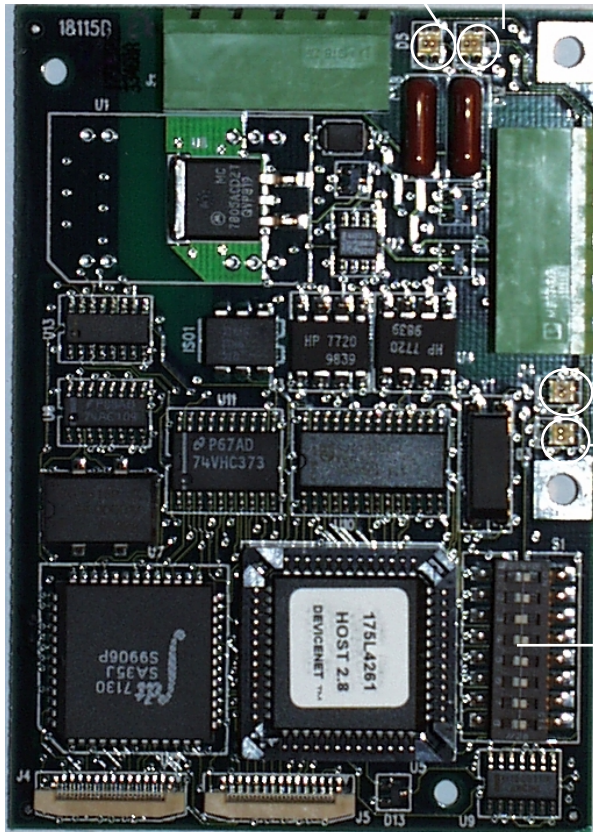


DeviceNet connection  
for Compact

Revisions number  
18115A

Revisions number  
18115D

Device status LED  
Network status LED

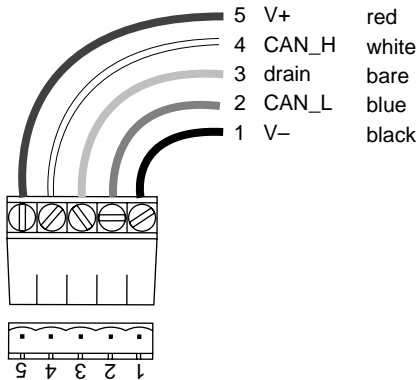


Device status LED  
Network status LED

Address switch and  
baud rate setting  
→ OFF = 1  
← ON = 0

### DeviceNet data

#### ■ DeviceNet connection

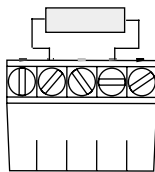


#### ■ DeviceNet termination

Termination resistors should be installed at each end of the bus line.

The resistors shall be mount between terminal 2 CAN\_L and terminal 4 CAN\_H and should have the following specification:

121 Ohm, 1 % Metal film and 1/4 Watt



#### ■ LEDs

For the device status LED:

1. when the LED is off, the device is off
2. when the LED is green, the device is operational
3. When the LED is flashing green, the device is in standby
4. when the LED is flashing red, the device detects a minor fault
5. when the LED is red, the device detects an unrecoverable fault
6. when the LED is flashing red/green, the device is self testing

For the network status LED:

1. when the LED is off, the network is non-powered/not online
2. when the LED is flashing green, the network is online but not connected
3. when the LED is green, the network is online and connected
4. when the LED is flashing red, the network has a connection time-out
5. when the LED is red, the network has a critical link failure.

#### ■ Cable length

Transmission speed	Max. total cable length [m]
125 kBaud	500
250 kBaud	250
500 kBaud	100

#### ■ Cable specification

- Cross section: max. 0.78 mm<sup>2</sup>, corresponding to AWG 18
- Cable type: twisted in pairs, 2 x 2 wires with drain wire in center
- Screening: Copper-braided screen or braided screen and foil screen

It is recommended to use the same cable type in the entire network to avoid impedance mismatch.

#### ■ Address and baud rate setting

Dip switch 1-6 set the VLT frequency converters address and 7-8 the baud rate.

If the address shall be set to 3 the dip switches should be set as follow:



ON = 0  
OFF = 1

Switch Settings for DeviceNet Module Baud Rate:

Baud Rate	Switch Setting 8	Switch Setting 7
125 kBPS	0	0
250 kBPS	0	1
500 kBPS	1	0
125 kBPS	1	1

#### ■ DeviceNet instructions

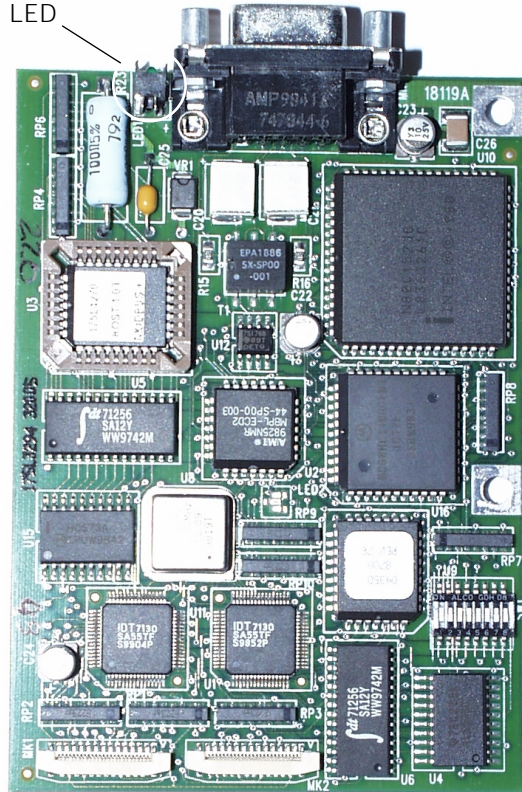
Allen-Bradley SLC 500.....MC.50.D1.02  
Allen-Bradley Control logix ..... MN.51.T1.02

All instructions are available on Danfoss Drives intranet.

### ■ Modbus+ card VLT 5000 Bookstyle

Network LED

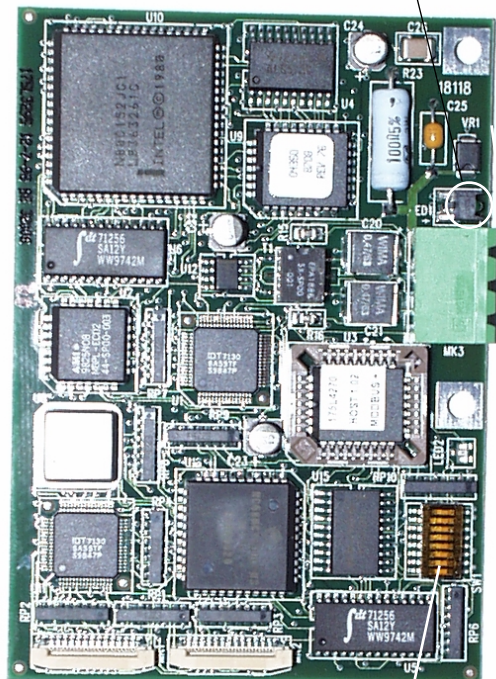
Top connector



Address switch

### ■ Modbus+ card VLT 5000 Compact

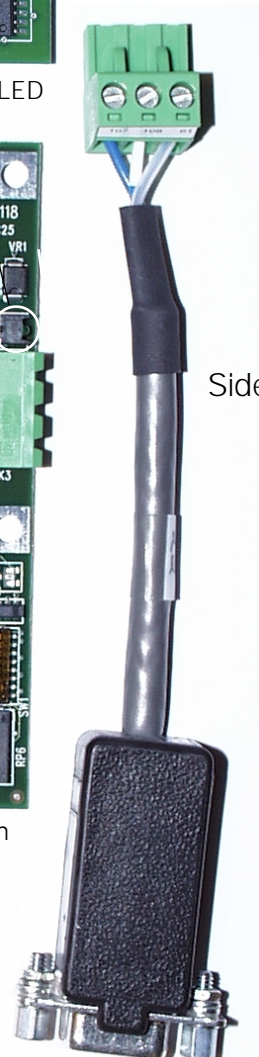
Network LED



Address switch

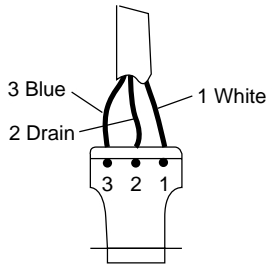


Side connector



## Modbus Plus data

### ■ Modbus connection



NOTE: Drain wire and shield should be insulated.

### ■ Modbus termination

It is essential that the bus line be terminated properly. A mismatch of impedance may result in reflections on the line that will corrupt data transmission.

The Modbus Plus Option card is provide with a pluggable screw connector for 176F1551 (Compact units) and a DB9 connector for 176F1550 (Book-style units).

An adaptor cable number 190703 is required for use with 176F1551.

Mating network connectors should be ordered from MODICON:

P/N AS-MBKT-085, (1) in-line connector

P/N AS-MBKT-185, (2) terminating connectors

### ■ LEDs

Modbus Plus status is shown by flashing a repetitive pattern on the network indicator (green LED). The patterns are:

- Six flashes per second;  
The node's normal operating state. The node is successfully receiving and passing the token. All nodes on the network should be flashing this pattern.
- One flash per second;  
The node is off-line after just being powered up, or after exiting the four flashes per second mode.
- Two flashes, then OFF for two seconds;  
The node is hearing the token being passed among other nodes, but is never receiving the token. Check the network for an open circuit or defective termination.

### ■ LEDs

- Three flashes, then OFF for 1.7 seconds;  
The node is not hearing any other nodes. It is periodically claiming the token, but finding no other node to which to pass it. Check the network for an open circuit or defective termination.
- Four flashes, then OFF for 1.4 seconds;  
The node has heard a valid message from another node that is using the same address as this node. The node remains in this state as long as it continues to hear the duplicate address. If the duplicate address is not heard for five seconds, the node then changes to the pattern of one flash every second.

NOTE: LED patterns other than those shown above indicate a possible hardware problem.

### ■ Cable specification and length

The recommended Modbus Plus cable is Belden 9841, shielded twisted pair.

Minimum length between nodes ..... 3 m

Maximum length without repeaters ..... 450 m

### ■ Address and baud rate setting

Dip switch 1-6 set the VLT frequency converters address. Dip switch are not 7-8 used.



ON = 0

OFF = 1

The address of the VLT frequency converter will be one higher than the binary value. With the above settings of the dip switches the address will be 4.

NOTE: Changes in switch settings are only active after power up.

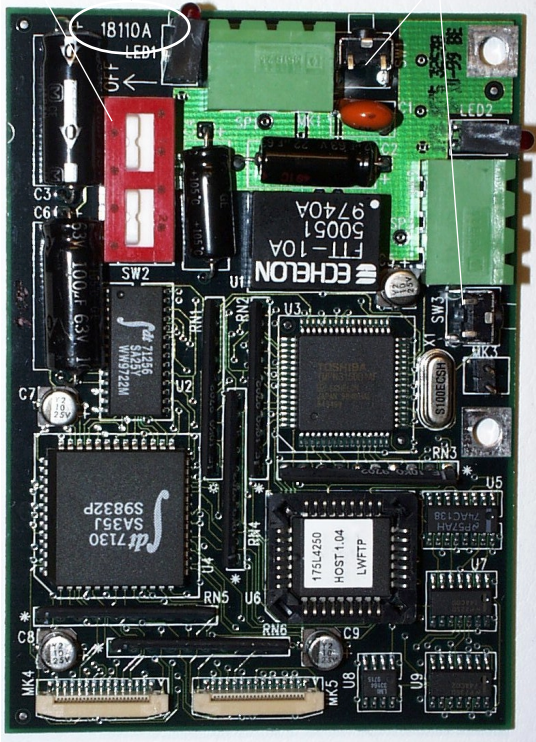
### ■ Modbus Plus instruction

Modbus ..... Modbus Plus Tech note

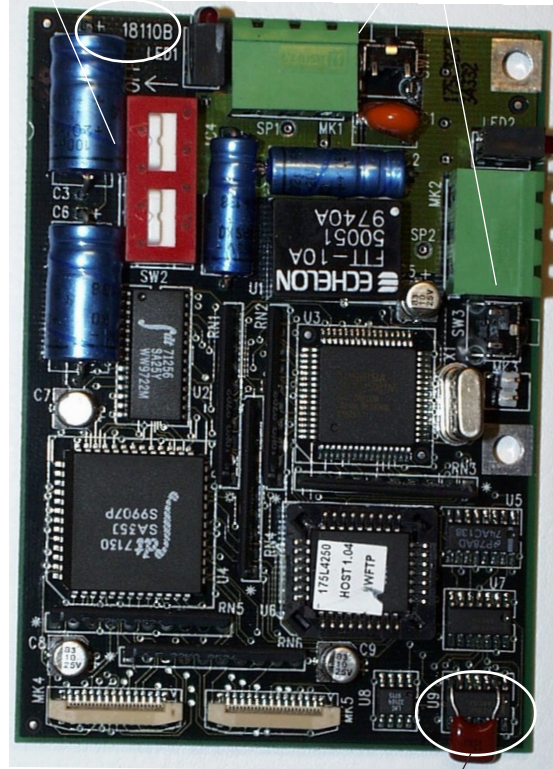
The Modbus Plus Tech note is available on Danfoss Drives intranet.

### ■ Lonworks cards VLT 5000/6000 Free Topology

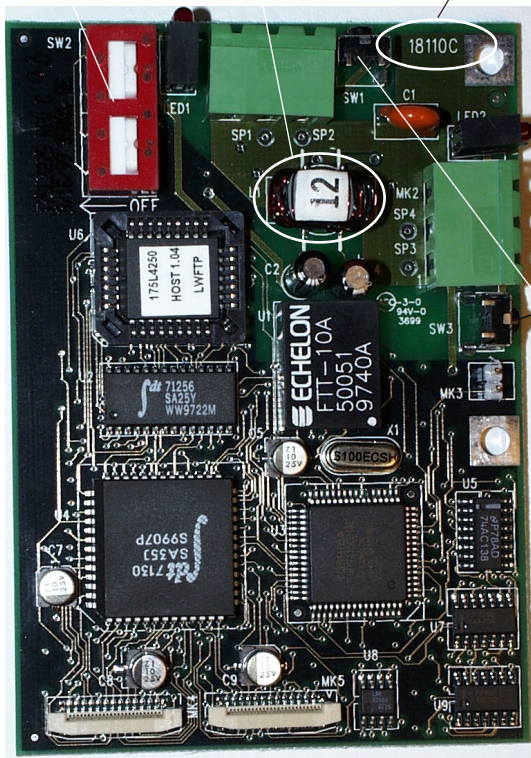
Terminator Switch    Revision number 18110A    Service Pin



Terminator Switch    Revision number 18110B    Service Pin



Terminator Switch    This ferrite coil is only mounted on revision C    Revision number 18110C



This capacitor is only mounted on revision B. The capacitor can also be mounted on revision A card.

## LonWorks data for FTT

### ■ LonWorks connection

61	
80	Net B 80
79	Net A 79

Connect signal wires to terminal 79 and to 80 of the terminal connector. In free topology model, connections can be reversed.

---

### ■ Lonworks termination

The option card has a termination resistor built-in which is activated by a terminator switch. Use of the terminator is optional, depending upon the network configuration. If termination is provided elsewhere in the network, the termination function should be OFF. Terminator switch position functions are provided in the table below.

Termination	Pos 1	Pos 2
No termination	Net Term Off	Don't Care
Single termination	Net Term On	Net Term Off
Double termination	Net Term On	Net Term On

---

### ■ LEDs

There are 2 LEDs on the LonWorks option card:  
 Green LED: Status LED  
 Red LED: Service LED, see LonWorks manual.

The Status LED patterns are:

#### **ON**

There is power on the board but there has not been any communication to an input network variable in the last 2 seconds.

#### **Flashing 10 times per second**

There is regular network communication to the VLT's input network variables.

#### **Flashing intermittently**

There is network communication to the VLT's input network variables but input network variables are received at a period greater than 2 seconds.

#### **Flashing 5 times per second**

The response to the network management "Wink" command. The VLT LonWorks node must be reset to leave the wink state.

OFF

No power on board or hardware fault.

---

### ■ Cable length

Free Topology Specifications

	Maximum node-to-node distance	Maximum total wire length
Belden 85102	500 m	500 m
Belden 8471	400 m	500 m
Level IV, 22AWG	400 m	500 m
JY (St) Y 2x2x0.8	320 m	500 m

Maximum bus length for segments with FTT-10 transceivers and with both FTT-10 and LPT-10 transceivers.

	FTT-10 transceivers only	FTT-10 and LPT-10 transceivers
Belden 85102	2700 m	2200 m
Belden 8471	2700 m	2200 m
Level IV, 22AWG	1400 m	1150 m
JY (St) Y 2x2x0.8	900 m	750 m

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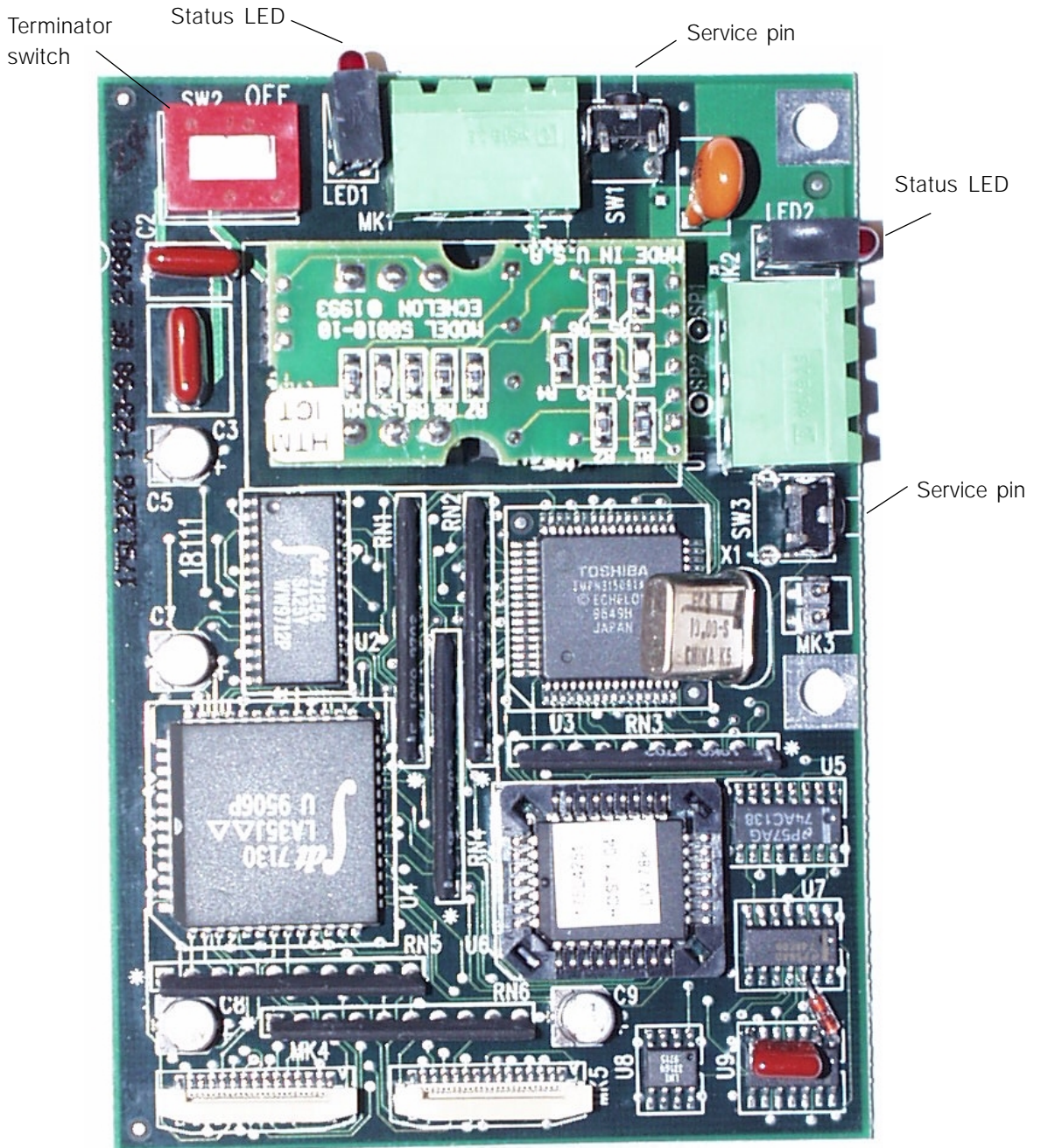
### ■ LonWorks instruction

LonMaker ..... MI.60.L1.02

The LonMaker instruction is available on Danfoss Drives intranet.

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■ Lonworks cards VLT 5000/6000 78 kbps and 1.25 Mbps



## LonWorks data for 78 kbps and 1.25 Mbps

### ■ LonWorks connection

61	
80	Net B 80
79	Net A 79

Connect signal wires NET A to terminal 79 and NET B to 80 of terminal connector.

---

### ■ Lonworks termination

The option card has a termination resistor built-in which is activated by a terminator switch. Use of the terminator is optional, depending upon the network configuration. If termination is provided elsewhere in the network, the termination function should be OFF. Terminator switch position functions are provided in the table below.

#### Switch 1:

##### Network Termination ON

The VLT LonWorks node is terminated.

##### Network Termination OFF

The VLT LonWorks node is not terminated.

---

### ■ LEDs

There are 2 LEDs on the LonWorks option card:  
 Green LED: Status LED  
 Red LED: Service LED, see LonWorks manual.

The Status LED patterns are:

#### ON

There is power on the board but there has not been any communication to an input network variable in the last 2 seconds.

#### Flashing 10 times per second

There is regular network communication to the VLT's input network variables.

#### Flashing Intermittently

There is network communication to the VLT's input network variables but input network variables are received at a period greater than 2 seconds.

### Flashing 5 times per second

The response to the network management "Wink" command. The VLT LonWorks node must be reset to leave the wink state.

OFF

No power on board or hardware fault.

---

### ■ Cable length

78 kbps and 1.25 Mbps Specifications

78 kbps    1.25 Mbps

Network bus length, Typical	2000 m	500 m
Network bus length, Worst case	1330 m	125 m

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### ■ Cable specification

Network Bus Wiring UL Level IV, 22 AWG (0.65 mm) twisted pair

Network Stub Wiring UL Level IV, 22 or 24 AWG (0.5 mm) twisted pair

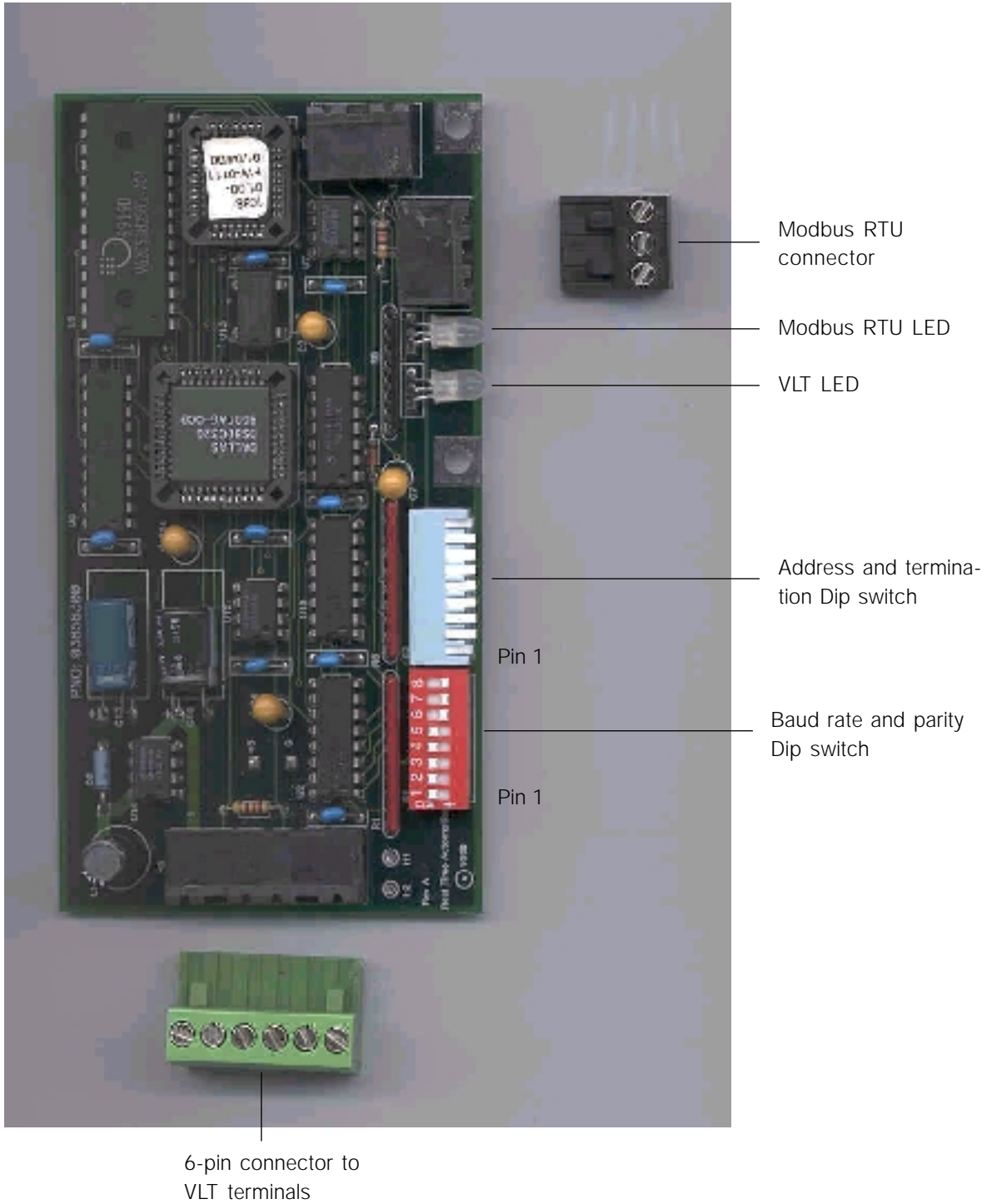
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### ■ LonWorks instruction

LonMaker ..... MI.60.L1.02

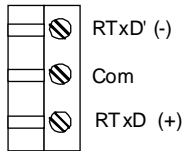
The LonMaker instruction is available on Danfoss Drives intranet.

■ Modbus RTU card for VLT 5000/6000

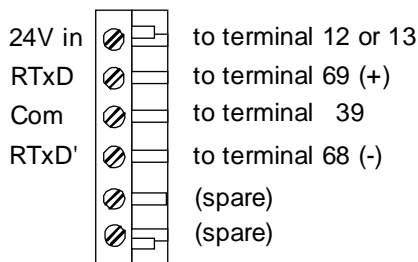


## Modbus RTU data

### ■ Modbus RTU connection



### ■ Connector from Modbus RTU to VLT



### ■ LEDs

There are 2 LEDs on the Modbus RTU option card. Both LEDs use the same communication pattern:

- Flashing Green (1 Hz): Communication online (VLT LED) or receiving data (Modbus LED).
- Flashing Red (1 Hz): Communication time out
- Solid Red: Major fault, communication stopped

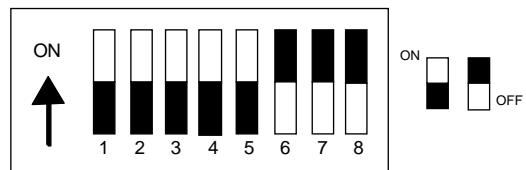
### ■ Baud rate and parity Dip switch

This Dip switch sets the baud rate and the parity on the Modbus network.

The baud rate can be set to 4800, 9600 (default) or 19200 baud by switches 1-3.

The parity bit can be set to None, Odd or Even (default) by switches 4-5.

See the Modbus manual for the Dip switch settings. Switches 6-8 are reserved switches.



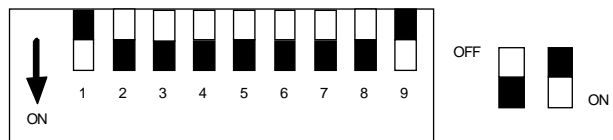
### ■ Address and termination Dip switch

This Dip switch sets the Modbus address and the termination.

The address can be set by switches 1-8. Default address is 1.

The termination can be set by switch 9. Default termination is ON.

See the Modbus manual for the Dip switch settings.



### ■ VLT parameter settings

As the Modbus RTU card interface to the built-in RS-485 FC profile the following parameters must be set in the VLT:

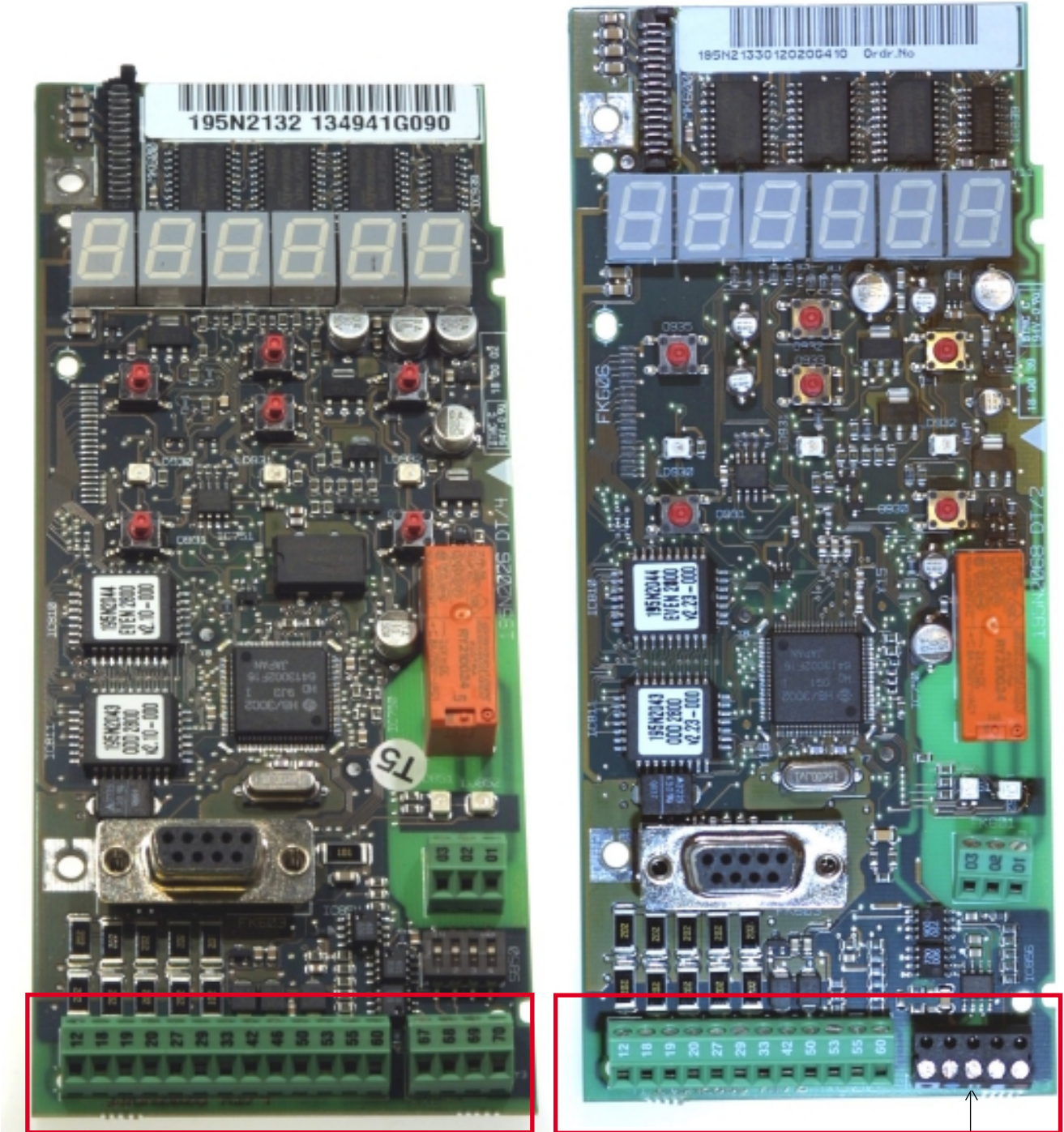
#### VLT 5000

Parameter 500 Address:	001
Parameter 501 Baud rate:	9600 baud
Parameter 512 Profile:	FC protocol

#### VLT 6000

Parameter 500 Profile:	FC protocol
Parameter 501 Address:	001
Parameter 502 Baud rate:	9600 baud

■ VLT 2800 fieldbus cards.



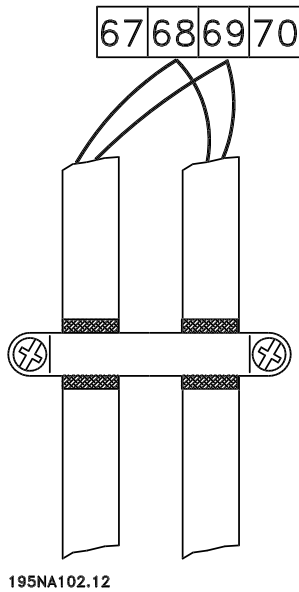
Profibus card

DeviceNet card

Plugable DeviceNet connector.

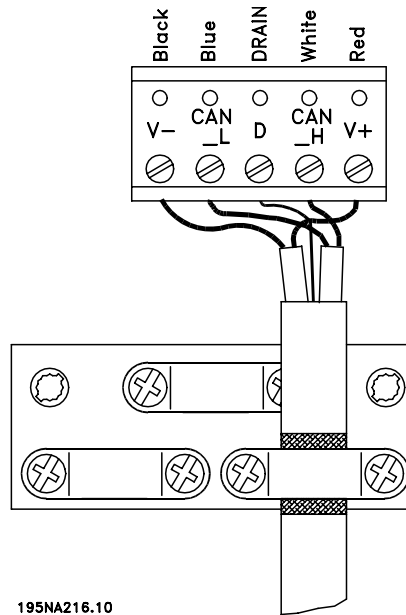
## VLT 2800 Profibus card

### ■ VLT 2800 Profibus connection



## VLT 2800 DeviceNet card

### ■ VLT 2800 DeviceNet connection



### ■ Technical data

Baudrate .....9.6 - 3000 kbaud  
 Address area ..... 1 - 126

### ■ 12 M baud Profibus card

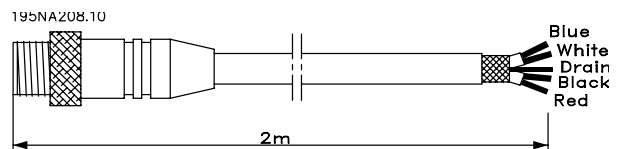
VLT 2800 can also be delivered with a 12 M baud Profibus control card.  
 Order number: ..... 195N0603

The order number is only for the control card with 12 M baud Profibus. The power part should be order separately.

### ■ Drop cable

An alternative to splicing two trunk lines in the connector on the control card, is using a DeviceNet connection box or a T-connector. For this kind of installation a drop cable is available as an option.

Drop cable ordering number: 195N3113



For other technical data on Profibus, see page 4 *Profibus Data*.

For other technical data on DeviceNet, see page 9 *DeviceNet Data*.

**■ Fieldbus options ordering number for VLT 5000:**
**Profibus:**

Type	Description	Ordering no.	Ordering no. with conformal coating
Profibus option	Incl. memory option	175Z0404	175Z2625
Profibus option	excl. memory option	175Z0402	

**Interbus:**

Interbus option	Incl. memory option	175Z3122	175Z3191
Interbus option	excl. memory option	175Z2900	
Interbus Gateway		175Z0408	

**DeviceNet:**

DeviceNet option	Incl. memory option	176F1580	176F1581
DeviceNet option	excl. memory option	176F1584	

**Modbus Plus:**

Modbus Plus for Compact units	Incl. memory option	176F1551	176F1553
Modbus Plus for Compact units	Excl. memory option	176F1559	
Modbus Plus for Bookstyle units	Incl. memory option	176F1550	176F1552
Modbus Plus for Bookstyle units	Excl. memory option	176F1558	

**LonWorks:**

LonWorks option, Free topology	Incl. memory option	176F1500	176F1503
LonWorks option, Free topology	excl. memory option	176F1512	
LonWorks option, 78 KBPS	Incl. memory option	176F1501	176F1504
LonWorks option, 78 KBPS	excl. memory option	176F1513	
LonWorks option, 1.25 MBPS	Incl. memory option	176F1502	176F1505
LonWorks option, 1.25 MBPS	excl. memory option	176F1514	

**■ Fieldbus options ordering number for VLT 6000:****Profibus:**

Type	Description	Ordering no.	Ordering no. with conformal coating
Profibus option	Incl. memory option	175Z7800	175Z2905
Profibus option	excl. memory option	175Z0402	

**LonWorks:**

LonWorks option, Free topology	Incl. memory option	176F1515	176F1521
LonWorks option, Free topology	excl. memory option	176F1512	
LonWorks option, 78 KBPS	Incl. memory option	176F1516	176F1522
LonWorks option, 78 KBPS	excl. memory option	176F1513	
LonWorks option, 1.25 MBPS	Incl. memory option	176F1517	176F1523
LonWorks option, 1.25 MBPS	excl. memory option	176F1514	