Altivar IMC integrated controller card
for Altivar 61 and 71 variable speed drives

The Altivar IMC integrated controller card is a compact optimized solution specifically developed for machine manufacturers (OEMs) focusing on applications such as textiles, lifting, pumping or woodworking, etc.
Its expansion capability is based on Schneider Electric's “Flexible Machine Control” concept.
The Altivar IMC integrated controller card boosts the expansion capability of machines and allows us to meet the OEM market's requirements in terms of performance, simplicity of use and openness.

Altivar IMC integrated controller card

Performance

Reduce the time it takes to develop your machines

- The use of a single SoMachine programming software environment offers a number of advantages:
  - A single project file
  - A single software program
  - A single download for the whole application
- The ease of use of PLCopen function blocks significantly reduces the time needed to program motion control and independent axis control on machines.

A more powerful machine

The Altivar IMC integrated controller card has 8 tasks to suit different machine requirements (cyclic, event-triggered, free).
A task can be synchronized with the task of the drive in which it is embedded. This task manages the speed reference, the torque reference, the speed feedback, the torque feedback, the number of encoder pulses feedback in order to increase machine performance.

A more intelligent drive

- Performs more complex operations (2 MB memory)
- Reduces program loading time (Mini-B USB connectors)
- Communication with all the other system devices (built-in Ethernet and CANopen connection ports)

Transparency of your machines

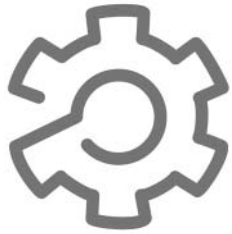
Access to all the other devices in the system architecture via CANopen is totally transparent due to FDT/DTM technology.

Development and technology

The Altivar IMC integrated controller card has been developed with two criteria in mind: low cost and practicality.

- Low cost because the standard equipment for the Altivar IMC card comprises:
  - Sixteen discrete I/O
  - A built-in Ethernet port
  - Two analog inputs
  - Two analog outputs
  - And a CANopen master
- Practicality because the Altivar IMC card is ideal for integration in Altivar 61 and 71 drives, and can therefore use:
  - Their inputs/outputs
  - Their communication cards
  - Their parameters: speed, current, torque, etc.
  - Their remote graphic display terminal
  - And also the inputs/outputs in their I/O expansion cards
  - Plus the speed feedback counter in the encoder interface cards

Software configuration



SoMachine V2.0 software platform

Configuration and programming of the Altivar IMC integrated controller card and equipment in Schneider Electric's “Flexible Machine Control” concept are both designed to cut costs and optimize your machine performance.
The SoMachine V2.0 software offers six IEC 61131-3 programming languages:

- Instruction List (IL)
- Ladder (LD)
- Function Block Diagrams (FBD)
- Grafcet (SFC)
- Structured Text (ST)
- CFC: Continuous Function Chart

As well as PLCopen function blocks, for handling motion control and axis control on your machines.

Integration in the Schneider Electric product offer

Combined with other dedicated OEM products in the Schneider Electric offer, such as Altivar variable speed drives, Lexium servo drives, Magelis HMI terminals, TeSys motor starters and contactors, the Altivar IMC integrated controller card can be integrated transparently in a number of architectures.

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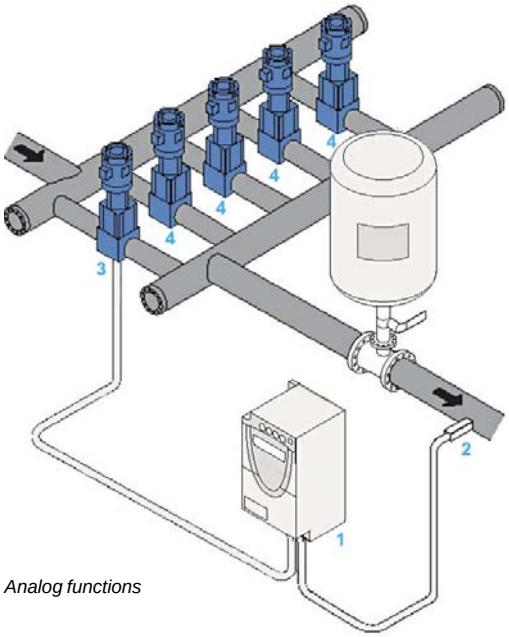
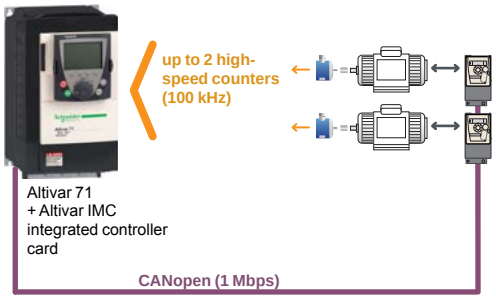
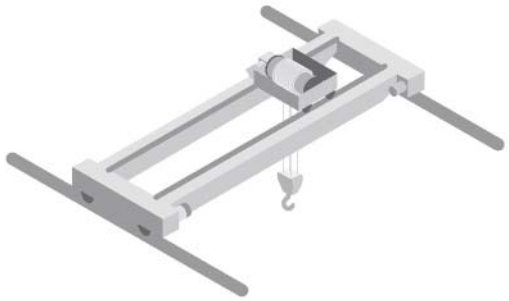


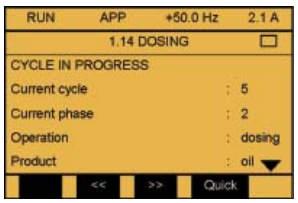
Analog functions



High-speed counter function (one-phase or two-phase)



Machine with CANopen architecture:
- *Lifting motion: Altivar 71*
- *Translatory motion: Altivar 312*
- *Carriage motion: Altivar 312*



Menu 1.14

Functions

Analog functions

For machines that require functions to process data issued by analog sensors/ actuators (voltage or current), temperature sensors, pressure or PID control sensors, the Altivar IMC card has, as standard, 2 analog inputs (voltage or current) with 10-bit resolution and 2 analog outputs (current) with 10-bit resolution.

1 Altivar IMC integrated controller card installed on Altivar 71
2 Pressure sensor
3 Variable speed pump
4 Fixed speed pumps

HSC high-speed counting and/or incremental encoder function

In order to meet requirements for machine productivity, the Modicon M258 logic controller has 2 embedded high-speed counters with a counting frequency of 100 kHz for each channel as well as 4 reflex outputs. The availability of these embedded counters and also the presence of the master CANopen link makes it quick and easy to create low-cost, high-performance multi-axis functions that suit the machines limitations.
With the availability of “PLCopen” function blocks specific to the motion control functions in the SoMachine V2.0 software, application development is sure to be quick and reliable.
In addition, these high-speed counting inputs can be used as an incremental encoder (A/B) with a frequency of 100 kHz in order to adapt to the machine's specific requirements.

Position control function

Several options are offered in terms of position control:
- Either creating a sequence in Lexium 32 servo drives, with communication with the Altivar IMC integrated controller card achieved by the use of discrete I/O
- Or creating an application in the Altivar IMC card and controlling the Lexium 32A/32M servo drives and/or SD3●● stepper motor drives via the master CANopen integrated link.

Communication function

Ethernet

The Altivar IMC integrated controller card has a built-in RJ45 Ethernet port (10/100 Mbps, MDI/MDIX) with Ethernet TCP Modbus, SoMachine on Ethernet, UDP, TCP and SNMP protocols.
In addition, the Altivar IMC card has an embedded Web Server and FTP Server.
As well as the default address based on the MAC address, it is possible to assign a controller IP address via a DHCP server or via a BOOTP server.

CANopen

The Altivar IMC integrated controller card has an embedded CANopen master which can be used to control devices on a communication bus with ease.
The link can be configured between 20 kbps and 1 Mbps and supports up to 16 slaves.
Architectures based on CANopen can be used to distribute I/O modules as close to the sensors and actuators as possible, thus reducing wiring costs and times, and to communicate with different devices such as variable speed drives, servo drives, etc.
The CANopen configurator is integrated in the SoMachine V2.0 software and can also be used to import standard description files in EDS format.

Customization function on the graphic display terminal

Menu 1.14

The remote graphic display terminal on Altivar 61 and 71 drives includes a menu dedicated to the Altivar IMC integrated controller card.
The user is offered a graphic display of 8 lines of 24 characters.
This menu can be customized simply and directly using the SoMachine V2.0 software. The user can define the language, name, unit, decimal point, and the type of parameter he wishes to customize for his own application. The user can also define alarms and error messages for his application.

Clock function

A time and date-stamping function combined with a clock backed up by a lithium battery makes it possible to keep a log of events that have occurred. When the Altivar IMC integrated controller card is installed in the drive, drive faults are automatically time and date-stamped without the need for any special programming.

Altivar IMC integrated controller card
for Altivar 61 and 71 variable speed drives

Communication

The Altivar IMC integrated controller card has the following built-in communication ports:

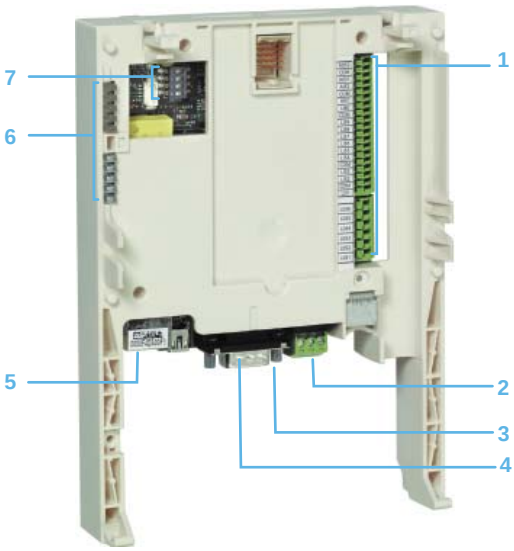
Communication ports	Use
1 x RJ45 (MDI/MDIX port)	□ FTP server □ Web server □ Modbus TCP server □ Modbus TCP client □ Manager SoMachine V2.0 □ SNMP □ Modbus device
1 x mini-USB	Programming port (480 Mbps)
1 x 9-way male SUB-D	Master CANopen connection

Embedded Ethernet

The Altivar IMC integrated controller card has an embedded Ethernet link via a direct connection to its RJ45 port.

- Speed: “10 BaseT” and “100 BaseTX” with auto-negotiation
- RJ45 port (MDI/MDIX): automatic adaptation to a straight or crossed cable

Protocols	Number of connections
Modbus server	8
Modbus device	2
FTP server	4
Web server	10



Description

The Altivar IMC integrated controller card comprises:

1 Three spring connectors for:
- □ 10 digital inputs
- □ 6 digital outputs
- □ 2 analog inputs
- □ 2 analog outputs
- □ 2 commons

2 A connector with removable screw terminals, 3 contacts at intervals of 3.81 for the 24 V ⎓ power supply

3 A mini USB-B connector for programming using SoMachine software

4 A 9-way SUB-D connector for connection to the CANopen machine bus

5 An RJ45 connector for connection of the SoMachine software workshop and/or connection to an Ethernet Modbus TCP network

6 Five LEDs:
- □ 1 green/yellow ETH LED for Ethernet activity
- □ 1 green/red NS (Network status) LED
- □ 1 green/red MS (Module status) LED
- □ 1 green/red CAN (CANopen activity) LED
- □ 1 green/red LED programmable by the user

7 Four configuration selector switches

References

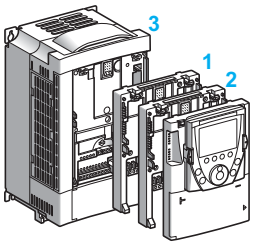
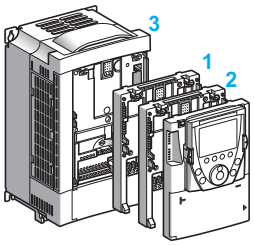
Designation	Used for	Voltage	Reference	Weight kg
Altivar IMC integrated controller card	Altivar 61 and 71 variable speed drives	24 V ⎓	**VW3 A3521S0**	0.185

Altivar IMC integrated controller card

for Altivar 61 and 71 variable speed drives

Altivar IMC integrated controller card, digital I/O cards and communication cards

Applications		**Industrial machines: handling, textiles, winder/unwinder, pumping (booster stations, irrigation, etc.)**
		
User memory	RAM	2 MB
	Flash	2 MB
Data storage memory FRAM (Ferroelectric RAM)		64 Kb
Typical time (for 1000 Boolean instructions)		942 µs
User program size		1 MB
Power supply		24 V ⎓
Inputs	Digital	10 x 24 V ⎓ inputs, 4 of which can be used for 2 high-speed counter inputs (100 kHz) or 2 incremental encoders (A/B) (100 kHz)
	Analog	2 x 0…20 mA inputs
Outputs	Digital	6 transistor outputs (2 A) - source
	Analog	2 x 0…20 mA outputs
Built-in communication ports	RJ45 port	Ethernet Modbus TCP, Web/FTP Server
	SUB-D connector (male 9-way)	Master CANopen bus (16 slaves)
	USB-B mini-port	SoMachine V2.0 software programming
Real-time clock		Integrated
Altivar IMC integrated controller card		**VW3 A3521S0**

Installation	Altivar IMC card (1) and digital I/O card (2) or communication card (2) on Altivar 71 or 61 variable speed drive (3)		< or >	
Note: A single digital I/O card or communication card can be mounted simultaneously with the Altivar IMC card on an Altivar 71 or 61 variable speed drive				
Resources on I/O cards or communication cards		**Depending on model of I/O card installed addition of:** □ 4 x 24 V ⎓ digital inputs □ 2 x 0.2 A digital transistor outputs (Sink/ Source) □ 1 frequency control input, range 0… 30 kHz □ 1 analog input configurable as a voltage/current input □ 1 differential current input □ 2 analog outputs configurable as voltage/current outputs □ 1 relay output with NO/NC contact, 30 V ⎓/250 V ∿ □ 1 input for up to 6 PTC probes		**Depending on model of communication card installed, access to:** □ Modbus Plus □ Uni-Telway □ InterBus-S □ Profibus DP □ DeviceNet □ Ethernet Modbus TCP □ Fipio □ Lonworks (ATV 61) □ METASYS N2 (ATV 61) □ APOGEE FLN (ATV 61) □ BACnet (ATV 61) □ EtherNet IP □ CC-Link
Card type		**VW3 A32●●**		**VW3 A33●●**

Resources available on drives		Integrated I/O
Power supply		Internal or external
Integrated inputs	Digital	5 x 24 V ⎓ inputs
	Digital or PTC	1 input configurable as a 24 V ⎓ digital input or as an input for up to 6 PTC probes
	Safety	1 input for the “Power removal” safety function and/or for thermal protection of the ATEX motor for applications in explosive atmospheres
	Analog	1 input configurable as a voltage/current input (0-10 V, X-Y mA from 0…20 mA)
	Differential analog	1 ± 10 V input
Integrated outputs	Analog	1 analog output configurable as a voltage/current output or as a digital output
	Relay	1 x 5 A relay output with NO/NC contact, 30 V ⎓/250 V ∿ or with NC contact, 30 V⎓/250 V ∿
Drive type		**ATV 71●●●, ATV 61●●●**

Altivar IMC integrated controller card
for Altivar 61 and 71 variable speed drives
Built-in CANopen bus port

TeSys U with communication module LUL C08

LEX 32A

Altivar 312

Lexium ILA1B

Altivar 71

Altivar 61

Altivar 32

Presentation

Schneider Electric has selected the CANopen bus for its machines and installations because of its wealth of functions and its resulting benefits in the automation world. This decision was based on the general acceptance of CANopen by the automation engineer community due to its openness and universality, and the fact that CANopen products are increasingly used in control system architectures.

CANopen is an open communication bus supported by more than 400 companies worldwide, and promoted by CAN in Automation (CIA) http://www.can-cia.org/. CANopen conforms to standards EN 50325-4 and ISO 15745-2.

CANopen brings transparency to Ethernet

The CANopen bus is a multi-master bus ensuring reliable, deterministic access to real-time data in control system equipment. The CSMA/CA protocol is based on broadcast exchanges, sent cyclically or on an event, to ensure optimum use of the bandwidth. A message handling channel can also be used to define slave parameters.

The bus uses a double shielded twisted pair on which, with the Altivar IMC integrated controller card, a maximum of 16 slave devices are connected by daisy-chaining or by tap junctions. The variable data rate between 20 kbps and 1 Mbps depends on the length of the bus (between 20 m and 1000 m).
Each end of the bus must be fitted with a line terminator.

The CANopen bus is a set of profiles on CAN systems, possessing the following characteristics:
- Open bus system
- Data exchanges in real time without overloading the protocol
- Modular design allowing modification of size
- Interconnection and interchangeability of devices
- Standardized network configuration
- Access to all device parameters
- Synchronization and circulation of data from cyclic and/or event-controlled processes (short system response time)

Connectable Schneider Electric devices

The following Schneider Electric devices can be connected to the CANopen bus:
- Ø 58 mm OsiSense XCC multi-turn absolute encoders: **XCC 3510P/ 3515C S84CB**.
- TeSys U starter-controllers with communication module **LUL C08**.
- TeSys T motor management system with controller **LTM R●●C●●**.
- Modicon OTB IP 20 distributed I/O with I/O expansion modules with interface module **OTB 1C0 DM9LP**.
- IP 67 Modicon FTB monobloc I/O splitter boxes **FTB 1CN●●●●**.
- Preventa configurable safety controllers **XPS MC16ZC/MC32ZC**.
- Altivar 312 variable speed drives for asynchronous motors (0.18…15 kW) **ATV 312H●●●●**.
- Altivar 61 and Altivar 71 variable speed drives for asynchronous motors (0.75…630 kW) **ATV 61H●●●●/71H●●●●**.
- Altivar 32 variable speed drives for asynchronous motors (0.18…15 kW) **ATV 32H●●●●**.
- Lexium 05/Lexium 32 servo drives (0.15…7 kW) for BSH/BSM servo motors **LXM 05A●D●●●●/ LXM 32A●D●●●●**.
- Lexium integrated drives **ILA1B**, **ILE1B** and **ILS1B**.

Altivar IMC integrated controller card
for Altivar 61 and 71 variable speed drives
Built-in CANopen bus port

Architecture

1 Altivar IMC card
2 Altivar 71 variable speed drive

Altivar IMC integrated controller card CANopen port

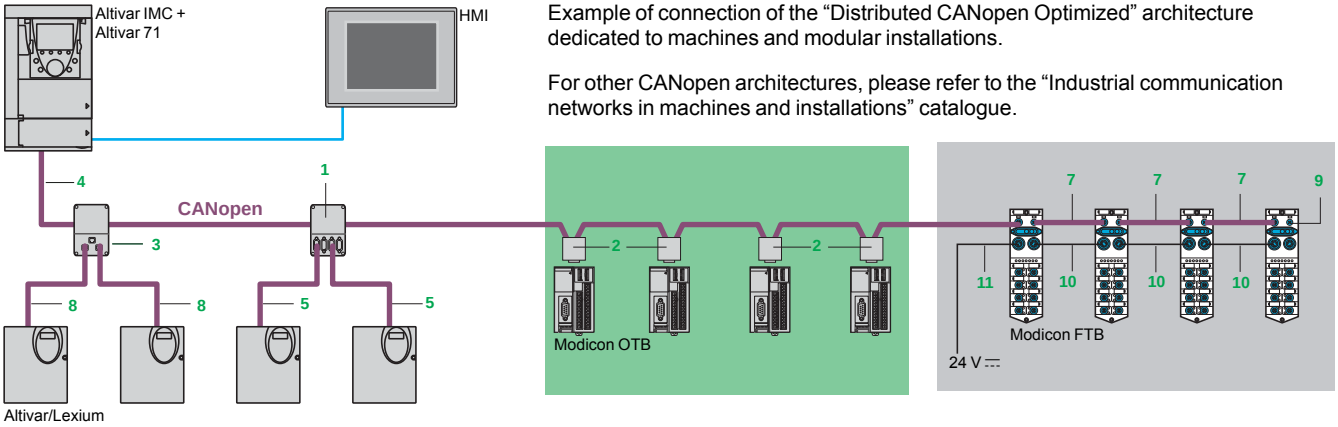
The Altivar IMC integrated controller card has a built-in 9-way male SUB-D CANopen port and acts as the CANopen master.
The bus consists of a master station, the Altivar IMC card, and slave stations. The master is in charge of configuration, exchanges and diagnostics to the slaves.
The CANopen bus is used to manage a variety of slaves such as:

- Discrete slaves
- Analog slaves
- Variable speed drives
- Motor starters
- Etc.

CANopen port							
Standards		DS 301 V4.02, DR 303-1					
Class		Conformity class M20, limited to 16 slaves					
Data rate	Max. length (m)	**20**	**100**	**250**	**500**	**1000**	**2500**
	Data rate (kbps)	1000	500	250	125	50	20
Number of slaves		16 max. with max. limit of: 64 TDPOs and 64 RPDOs					
Connection		On 9-way male SUB-D port					

Altivar IMC integrated controller card
for Altivar ATV 61 and 71 variable speed drives
Built-in CANopen bus port

CANopen architecture



Example of connection of the “Distributed CANopen Optimized” architecture dedicated to machines and modular installations.

For other CANopen architectures, please refer to the “Industrial communication networks in machines and installations” catalogue.

References

Standard tap junctions and connectors

Designation	Description	No.	Length	Unit reference	Weight kg
IP 20 CANopen tap junction	- 4 SUB-D ports - Screw terminals for connection of trunk cables - Line termination	1	–	**TSX CAN TDM4**	0.196
IP20 CANopen connectors 9-way female SUB-D. Switch for line termination	90° angled	2	–	**TSX CAN KCD F90T**	0.046
	- For connection to Altivar IMC integrated controller card - Straight	–	–	**TSX CAN KCD F180T**	0.049
	- For PC connection or diagnostic tool - 90° angled	–	–	**TSX CAN KCD F90TP**	0.051
IP 67 M12 connectors	Male	–	–	**FTX CN 12M5**	0.050
	Female	–	–	**FTX CN 12F5**	0.050
IP 20 CANopen tap junction for Altivar and Lexium	2 RJ45 ports	3	–	**VW3 CAN TAP2**	–
Daisy chain taps	Equipped with: - 2 spring terminal blocks for connecting the CANopen bus in a daisy chain - 1 preassembled cordset with an RJ45 connector for connecting the drive	–	0.6	**TCS CTN 026M 16M**	–
	Equipped with: - 2 RJ45 connectors for connecting the CANopen bus in a daisy chain - 1 preassembled cordset with an RJ45 connector for connecting the drive	–	0.3	**TCS CTN 023F 13M03**	–
CANopen line terminators	For RJ45 connector Sold in packs of 2	–	–	**TCS CAR013M120**	–
	For screw terminal connector Sold in packs of 2	–	–	**TCS CAR01NM120**	–

IP 20 standard cables and preassembled cordsets

Designation	Description	No.	Length	Reference	Weight kg
CANopen cables (2 x AWG 22, 2 x AWG 24)	- For standard environment *(1)* - CE marking: low smoke - Zero halogen - Flame-retardant (IEC 60332-1)	4	50 m	**TSX CAN CA50**	4.930
			100 m	**TSX CAN CA100**	8.800
			300 m	**TSX CAN CA300**	24.560
	- For standard environment *(1)* - UL certification - CE marking: flame-retardant (IEC 60332-2)	4	50 m	**TSX CAN CB50**	3.580
			100 m	**TSX CAN CB100**	7.840
			300 m	**TSX CAN CB300**	21.870
	- For harsh environments *(1)* or mobile installation - CE marking: low smoke Zero halogen - Flame-retardant (IEC 60332-1) - Oil-resistant	4	50 m	**TSX CAN CD50**	3.510
			100 m	**TSX CAN CD100**	7.770
			300 m	**TSX CAN CD300**	21.700


TSX CAN TDM4


VW3 CAN TAP2


TSX CAN KCD F90T


TSX CAN KCD F90TP


TSX CAN KCD F180T


TCS CAR013M120

(1) Standard environment: No particular environmental constraints, operating temperature between + 5°C and + 60°C, and in fixed installations.
Harsh environment: Resistance to hydrocarbons, industrial oils, detergents, solder splashes, relative humidity up to 100%, saline atmosphere, significant temperature variations, operating temperature between - 10°C and + 70°C, or in mobile installations.

References (continued)

IP 20 standard cables and preassembled cordsets (continued)

Designation	Description	No.	Length	Reference	Weight kg
CANopen preassembled cordsets One 9-way female SUB-D connector at each end	- For standard environment *(1)* - CE marking: low smoke - Zero halogen - Flame-retardant (IEC 60332-1)	–	0.3 m	**TSX CAN CADD03**	0.091
			1 m	**TSX CAN CADD1**	0.143
			3 m	**TSX CAN CADD3**	0.295
			5 m	**TSX CAN CADD5**	0.440
	- For standard environment *(1)* - UL certification - CE marking: flame-retardant (IEC 60332-2)	–	0.3 m	**TSX CAN CBDD03**	0.086
			1 m	**TSX CAN CBDD1**	0.131
			3 m	**TSX CAN CBDD3**	0.268
			5 m	**TSX CAN CBDD5**	0.400
CANopen preassembled cordsets	Preassembled cordsets with: - One 9-way female SUB-D connector - and 1 RJ45 connector	5	0.5 m	**TCS CCN 4F3 M05T**	–
			1 m	**TCS CCN 4F3 M1T**	–
			3 m	**TCS CCN 4F3 M3T**	–
	Preassembled cordsets with: - One 9-way female SUB-D connector - and one RJ45 connector with built-in line termination	5	1 m	**VW3 M38 05 R010**	–
			3 m	**VW3 M38 05 R030**	
	Preassembled cordsets with two 9-way SUB-D connectors (one female and one male)	–	0.5 m	**TLA CD CBA 005**	–
			1.5 m	**TLA CD CBA 015**	–
			3 m	**TLA CD CBA 030**	–
			5 m	**TLA CD CBA 050**	–

IP 67 standard preassembled cordsets

CANopen preassembled cordsets	Preassembled cordsets with two 5-way M12 A-coded angled connectors (one female and one male)	7	0.3 m	**FTX CN 3203**	0.40
			0.6 m	**FTX CN 3206**	0.70
			1 m	**FTX CN 3210**	0.100
			2 m	**FTX CN 3220**	0.160
			3 m	**FTX CN 3230**	0.220
			5 m	**FTX CN 3250**	0.430

VW3 CAN A71

IP 20 connection accessories

CANopen connector for Altivar 71 *(2)*	- 9-way female SUB-D - Switch for line termination - Cables exit at 180°	–	–	**VW3 CAN KCDF 180T**	–
Adaptor for Altivar 71 drive	CANopen adaptor SUB-D to RJ45	–	–	**VW3 CAN A71**	–
CANopen preassembled cordsets	One RJ45 connector at each end	8	0.3 m	**VW3 CAN CARR03**	–
			1 m	**VW3 CAN CARR1**	–

IP 67 connection accessories for Modicon FTB/FTM monobloc and modular splitter boxes

Designation	Composition	No.	Length	Reference	Weight kg
IP 67 line terminator	Equipped with one M12 connector (for end of bus)	9	–	**FTX CNTL12**	0.010
24 V ⎓ power supply connection cables	Equipped with two 5-way 7/8 connectors	10	0.6 m	**FTX DP2206**	0.150
			1 m	**FTX DP2210**	0.190
			2 m	**FTX DP2220**	0.310
			5 m	**FTX DP2250**	0.750
	Equipped with one 5-way 7/8 connector at one end and flying leads at the other end	11	1.5 m	**FTX DP2115**	0.240
			3 m	**FTX DP2130**	0.430
			5 m	**FTX DP2150**	0.700
T-connector for power supply	Equipped with two 5-way 7/8 connectors	–	–	**FTX CNCT1**	0.100

FTX DP21●●

(1) Standard environment: No particular environmental constraints, operating temperature between + 5°C and + 60°C, and in fixed installations.
Harsh environment: Resistance to hydrocarbons, industrial oils, detergents, solder splashes, relative humidity up to 100%, saline atmosphere, significant temperature variations, operating temperature between - 10°C and + 70°C, or in mobile installations.

(2) For **ATV 71H●●●M3**, **ATV 71HD11M3X**, **ATV 71HD15M3X**, **ATV 71H075N4**... **HD18N4** *drives, this connector can be replaced by the* **TSX CAN KCDF 180T** *connector.*