

ALTIVAR 18 MAINTENANCE MANUAL SUMMARY

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1. Generalities

1.1 Objective

The present document is about the policy and resources to implement for on-site repair of the Altivar 18.

This repairing is carried out with the replacement of elements supplied by SCHNEIDER. It is exclusive to the "Transparency Contract" project. There is a local responsible of this special offer in the countries that have signed this contract.

1.2 Concerned products

This document concerns the ATV18 of following calibre:

Size 1	ATV18U09M2	0.37kW-230V
	ATV18U18M2	0.75kW-230V
Size 2	ATV18U29M2	1.5kW-230V
	ATV18U18N4	0.75kW-400V
	ATV18U29N4	1.5kW-400V
Size 3	ATV18U41M2	2.2kW-230V
	ATV18U54M2	3kW-230V
	ATV18U72M2	4kW-230V
	ATV18U41N4	2.2kW-400V
	ATV18U54N4	3kW-400V
	ATV18U72N4	4kW-400V
Size 4	ATV18U90M2	5.5kW-230V
	ATV18D12M2	7.5kW-230V
	ATV18U90N4	5.5kW-400V
	ATV18D12N4	7.5kW-400V
Size 5	ATV18D16N4	11kW- 400V
	ATV18D23N4	15kW-400V

1.3 Product design and manufacturing

All the modules, accessories and software are designed and developed by Schneider Electric on its own or in co-operation with selected partners.

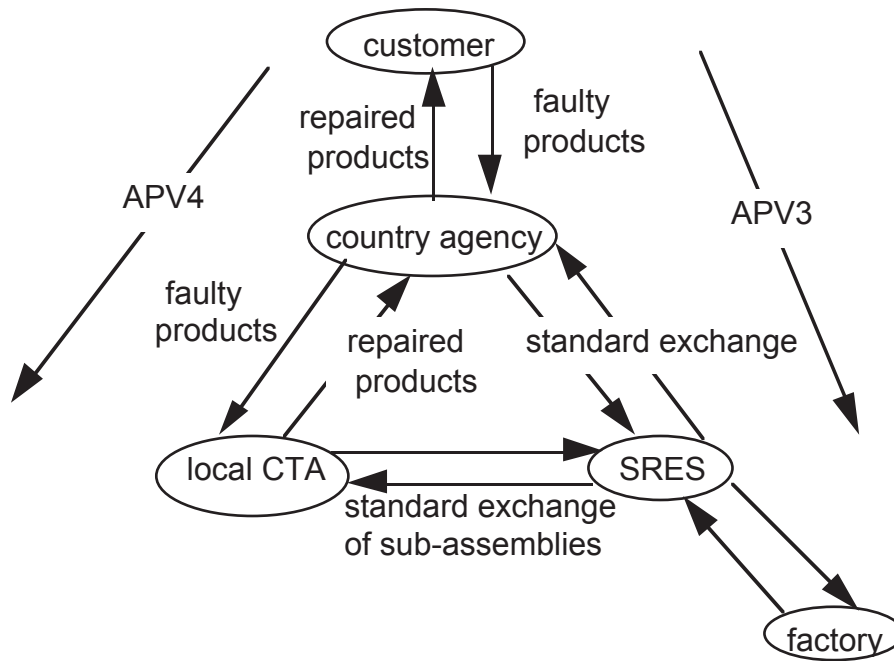
At each design and manufacturing step, the products are processed with great care. To guarantee a high quality level, the products are thoroughly monitored.

1.4 Exchange and repair

The ALTIVAR 18 is of *after-sale category 2*, but the countries locally organised to provide a first level of expertise may repair the drives and will be allowed to access to the spare parts.

In case of major defect or for addition of new functions, the updating of products will be necessary. In this case, information will be transmitted to all SCHNEIDER networks.

The time of delivery for the repaired or new element will be given by the dealer or the *-S-commercial unit*. The quality of the replacement service is based on the stocks constituted at Evreux, in the branches and by the official dealers.



Definition of the after-sale categories:

• **APV2**

After-sale category 2: Not repairable drive, to be replaced by a new drive free of charge when under guarantee. Exchanged by a new drive at a special rate after the guarantee period.

• **APV3**

After-sale category 3: Repairable product with standard exchange.

Under guarantee: Replaced free of charge by a new product.

After the guarantee period: Delivery of a recycled product at a special rate.

This product symbol is marked out in the *Evreux* product file by R or TR.

• **APV4**

After-sale category 4: Product to be repaired. They are marked out in the product file by the symbol completed by TA. The indicated price is a set price for reparation of a product sent back to the factory.

Under guarantee: Product repaired free of charge.

After the guarantee period: Product repaired and invoiced.

1.5 Assistance

1.5.1 On-site intervention

The customer's on-site assistance will be ensured by the technicians and engineers of the SCHNEIDER "services" teams of the country of which the customer depends on.

1.5.2 Technical assistance

The first level of telephone assistance is ensured by the technicians of the SCHNEIDER agencies branches from which the customer depends on.

The second level of telephone assistance is done through the direct line of the Global Help Desk: Tel: +33 (0)1 41 39 39 00 – Fax: +33 (0)1 41 39 37 72

ccmail: [CI-GHD], rueil-gare

E-mail: rueil-gare_[ci-ghd]@mail.schneider.fr

1.5.3 Returns from customers

Returns of faulty materials (complete products or sub-assemblies) are carried out according to the proceedings defined in the Transparency Contract.

1.5.4 Stock updating

In case of major defect or for addition of new functions, the updating of products will be necessary. In this case, information will be transmitted to all SCHNEIDER networks.

2. Required abilities - Training

2.1 Required abilities

The Altivar repair has to be carried out by experienced technicians:

- Knowledge of the behaviours of the rotating machines driven by electronic Speed Drives.
- Principle of Power Controls and electronic Controls.
- Expertise on tools such as “Pc’s, Oscilloscope, Multimeter, etc.”

The qualified maintenance responsible will implement the procedure described in this manual for equipment and people protection.

- Read, understand and follow the instructions and cautions described in this manual or other quoted manuals.
- Use in a professional way the necessary tools.

2.2 Training

2.2.1 Customer's training

The Schneider Training Institute (S.T.I.) organises training sessions on speed drives in order to know how to implement these products. For more information, please contact the S.T.I. by phone (+33 (0)1 41 39 60 00) or by fax (+33 (0)1 41 39 60 72.).

2.2.2 Internal training

Many training sessions about the choice and implementation of speed drives are available.

The datasheet describing the course contents are to be found in the appendixes.

For more information, please read the guide of DAS CI training sessions.

2.2.3 After-sale service training

This training session is only reserved to the on-site operators. It requires a fair knowledge of the product and its applications (ventilation, pumping, convoying, etc.).

For more information, please contact the DAS CI training group Manager.

2.2.4 Training assistance

There is a training assistance available on:

- Intranet:
 - Go online to the DAS CI server.
 - Choose “Technical training”
- CDROM referenced “CIFOR”
 - To be ordered at “Schneider Comm. Services” - Meylan / France
 - Tel: +33 (0)4 76 60 59 17
 - +33 (0)4 76 60 59 02
 - Fax: +33 (0)4 76 60 67 32

Operation

Maintenance

Principles

VI 200 *
Variable speed control 5 days

Basic knowledge

VEG2 *
Variable speed controller solutions 5 days

VMEX *
Variable speed controller maintenance 3 days

VM8 *
Altivar ATV58 3 days

VM6 *
Altivar ATV66 3 days

VE6 *
Altivar ATV66 FVC 2 days

Expert

EXP46
Altistart ATS46 expert (and LH4N) 1 day

EXP18
Altivar ATV18 expert (and ATV08) 1 day

EXP66
Altivar ATV66 expert (and ATV66FVC) 1 day

SAV
Altivar after sales expert 7 days

EXP62
Altivar ATV62 expert 1 day

EXP58
Altivar ATV58 expert 1 day

MCOM
Introduction to communication fielbuses 1 day

COM ATV
ATV 58 , ATV 66 communication protocols 2 days

* Training courses given by the ISFs.

ATV18 and ATV08 EXPERT

EXP18

1 day

Training objectives

- To become an expert in the installation of Altivar ATV08 controllers (< 1kW) and ATV18 controllers (0.37 to 15 KW).

Knowledge required

- Knowledge of the main applications (cooling, pumping, handling).
- Thorough knowledge of power electronics.
- Knowledge of asynchronous motors.
- Good knowledge of speed drive products.
- Hands on experience.

COURSE CONTENTS

- Range.
- Technology.
- Performance.
- Protection.
- Client/sequence terminals.
- Functions.
- Options.
- Accessories.

DOCUMENTATION PROVIDED

ATV08 and ATV18 Training manuals.
Programming guide.

TEACHING NOTES

Simple speed controller, with basic functions which can be quickly understood and mastered.

Lectures : 70 %
Practical : 30 %

COURSE ORGANISER: SBS

LOCATION: RUEIL GARE

PRICE: Free

APPLICATION EQUIPMENT

Altivars ATV18 and ATV08.

3. Documentation

3.1 Catalogue

A specific Altivar 18 catalogue is available:

	FRENCH	ENGLISH
REF	VVDED296038FR	VVDED296039EN

3.2 Operating guide

A specific ATV18 operating guide is available:

ALTIVAR 18 VVDED396037 N°: 75962 Available Evreux 2.

3.3 M.I.T. Intranet

This is a collection of technical information sheets covering the VVD products (software versions, application sheets).

These documents can be consulted on the IC SBU Intranet site.

Address : <http://139.160.75.12>

select : MIT : Technical information / VSD

3.4 B.E.S.T. "Database of Experiments for Services and Technical assistance"

B.E.S.T is composed of two databases:

- Help Desk

The access to this database enables:

- To ask for a personalised answer from the DAS to a precise enquiry.
- A country to question its file of current or answered enquiries to have its status at the chosen instant, whenever the DAS is available or not.
- To question the database of all the enquiries already asked to the DAS to find a possible answer or a clue.

- Pro-Base

- Protected by a password.
- Pro-base is the DAS-CI / Country "Transparency Contract" tool. It is the real-time information about the quality of products and applications to enable a reliable diagnostic and a quick answer to a customer's complaint.

4. Repair department resources

4.1 *Equipment, measuring devices and tools*

4.1.1 Necessary tools to repair speed drives

- set of magnetic flat-blade screwdrivers,
- set of magnetic cross-point screwdrivers,
- set of torx screwdrivers,
- set of metric socket spanners, 5.5 to 14 mm with -" pin,
- 2" extension for socket spanner (" pin),
- 12" extension for socket spanner (" pin),
- set of metric Allen keys, 2 to 14 mm,
- set of metric swivel Allen keys, 2 to 14 mm,
- torque spanner, 0.5 to 10 Nm,
- metric Allen key sockets, for torque spanner, 2 to 14 mm,
- cross-point driver bits, for torque spanner,
- flat-blade driver bits, for torque spanner,
- needle nose pliers,
- contact lubricant,
- set of flat spanners 5.5 to 19 mm,
- set of ring spanners 5.5 to 19 mm,
- wires cutter,
- plastic clamps,
- multimeter,
- ammeter clip,
- oscilloscope,
- lamp to check thyristors continuity,
- single-phase alternostat (500 VA) for a voltage variation from 200V AC to 530V AC,
- digital or rotating-loop multimeter,
- anti-static strap.

4.1.2 Tools and accessories specific to the ATV18

For an user-friendly repair:

- Use the PC link additional device (VW3A18104),
- PC.

The two floppy disks of the PC software enable the saving of customers' configurations. This CDROM is equipped with the [SCALE18.EXE](#) software to carry out the drive calibration.

Their use is described in the chapter 9 "assistance to repair".

4.2 Test benches

After repair the drive has to be tested on-load on a test bench.

There is no bench test proposed by the DAS for this product.

The repair service may use the recommended connection sketch in the operating guide as a model to carry out the tests.

The power supply has to be protected by a circuit-breaker.

A motor of same power as the drive power and a control box (potentiometer and commutator FW/RV) are necessary.

4.3 Diagnostic help tools – Standard sub-assemblies

On this CDROM the DAS supplies VW3A18103 software to the Schneider repair centres to enable them to calibrate the drive. A VW3A18104 serial link cable is required.

Its use is described in the chapter 9 “assistance to repair”.

5. Spare parts

5.1 List of spare parts

NB: Considering that only the geographical units are allowed to repair the ATV 18, these spare parts are not directly available for the customers.

Spare parts	Delivery code	REFERENCE	Article N°
"Control" card for all calibre	T	VX4A181	076159
"Filter" cards			
ATV18U09M2	T	VX4A18101	076160
ATV18U18M2	T	VX4A18102	076161
ATV18U29M2	T	VX4A18103	076162
ATV18U41M2	T	VX4A18104	076163
ATV18U54M2, U72M2	T	VX4A18105	078302
ATV18U90M2, D12M2	T	VX4A18106	078303
ATV18U18N4, U29N4	T	VX4A18107	078304
ATV18U41N4, U54N4, U72N4	T	VX4A18108	078305
ATV18U90N4, D12N4	T	VX4A18109	078307
ATV18D16N4, D23N4	T	VX4A18110	078306
"Power" sub-assemblies			
ATV18U09M2	T	VX5A18U09M2	076170
ATV18U18M2	T	VX5A18U18M2	076171
ATV18U29M2	T	VX5A18U29M2	076173
ATV18U41M2	T	VX5A18U41M2	076175
ATV18U54M2	T	VX5A18U54M2	078308
ATV18U72M2	T	VX5A18U72M2	078309
ATV18U18N4	T	VX5A18U18N4	078310
ATV18U29N4	T	VX5A18U29N4	078311
ATV18U41N4	T	VX5A18U41N4	078312
ATV18U54N4	T	VX5A18U54N4	078313
ATV18U72N4	T	VX5A18U72N4	078314

Spare parts	Delivery code	REFERENCE	Article N°	
"Power" cards				
ATV18U90M2	T	VX5A18U90M2	078315	
ATV18D12M2	T	VX5A18D12M2	078316	
ATV18U90N4	T	VX5A18U90N4	078317	
ATV18D12N4	T	VX5A18D12N4	078318	
ATV18D16N4	T	VX5A18D16N4	078319	
ATV18D23N4	T	VX5A18D23N4	078320	
"Power" modules / IPM				
ATV18U90M2, D12M2	T	VZ3IM6075M0618	076188	75A-600V
ATV18U90N4, D12N4	T	VZ3IM6050M1218	078321	50A-1200V
ATV18D16N4, 23N4	T	VZ3IM6075M1218	078322	75A-1200V
Rectifiers				
ATV18U90M2, D12M2	T	VZ3DM6075M0818	076190	75A-800V
ATV18U90N4, D12N4, D16N4	T	VZ3DM6075M1618	078351	75A-1600V
ATV18D23N4	T	VZ3DM6100M1618	078353	100A-1600V
Condenser sub-assemblies				
ATV18U90M2	H	VY1ADC10118	078360	
ATV18D12M2	H	VY1ADC10218	078361	
ATV18U90N4, D12N4	H	VY1ADC10318	078357	
ATV18D16N4	H	VY1ADC10418	078358	
ATV18D23N4	H	VY1ADC10518	078359	
Load resistance sub-assemblies				
ATV18U90M2, D12M2	H	VY1ADR10118	078362	
ATV18U90N4, D12N4	H	VY1ADR10218	076199	
ATV18D16N4, D23N4	H	VY1ADR10318	076200	
Fans				
ATV18U29M2, U29N4	H	VZ3V181	078365	
ATV18U41M2, U54M2, U72M2, U41N4, U54N4, U72N4	H	VZ3V182	078367	
5.5 & 7.5 kW-230 V & 5.5 – 7.5 –400 V	H	VZ3V183	078366	
11 & 15 kW-400 V	H	VZ3V184	020580	
Power connection sub-assemblies				
ATV18U90M2, D12M2	H	VW3A18801	078363	
ATV18U90N4, D12N4	H	VW3A18802	076205	
ATV18D16N4, D23N4	H	VW3A18803	076206	
Housing				
ATV18U09M2, U18M2	M	VY1A18101	084687	
ATV18U29M2, U18N4, U29N4	M	VY1A18102	084688	
ATV18U41M2, U54M2, U72M2, U41N4, U54N4, U72N4	M	VY1A18103	084689	
ATV18U90M2, D12M2, U90N4, D12N4	M	VY1A18104	084690	
ATV18D16N4, D23N4	M	VY1A18105	084691	
Control support				
ATV18U90M2, D12M2, U90N4, D12N4	M	VY1A18106	084692	
ATV18D16N4, D23N4	M	VY1A18107	084693	
Sides				
ATV18U90M2, D12M2, U90N4, D12N4	M	VY1A18108	084694	
ATV18D16N4, D23N4	M	VY1A18109	084695	

5.2 Supply of spare parts

The operating guide is stored at Evreux.

The control cards are packed and sold in 5-piece quantity.

The power sub-assembly cards are individually packed and sold in 5-piece quantity.

6. Packing

6.1 *Packing availability*

6.2 *Packing cautions*

The product has to be packed in its specific packing before being sent back to the customer.

7. Configuration of products

Before starting the diagnostic and/or repair, you have to backup the customer's configuration to restore it during product re-installation.

7.1 Configuration backup

Connect the PC link additional part to the drive and carry out the following sequence from the PC software:

- Connection to the drive
- File, Save as (example: Client 1.18c)

The configuration and adjustment parameters are saved.

7.2 Configuration reloading

Connect the PC link additional part to the drive and carry out the following sequence from the PC software:

- Connection to the drive
- File, Open the previously saved customer's file
(example: Client 1.18c)

The configuration and adjustment parameters are restored.

8. Troubleshooting

8.1 *Drive identification*

Before starting the repair, note the following points:

- Drive voltage
- Drive calibre
- Software version
- Guarantee date

8.2 *Analysis of the drive use and environment*

- Get the maximum information from the customer
- Machine type, kinematic chain, neutral rate, etc.
- Equipment sketch: the connections of the control and power circuits have to comply with the recommended sketch indicated in the operating guide
- Drive use conditions: temperature, humidity, installation location, vibrations, pollution, CEM disturbed environment or network.
- Failure causes and fault code
- Status of logic inputs during the running phase generating the failure
- Check that the adjustments comply with the application
- Has the drive change solved the failure for the drives under guarantee?

8.3 *Drive visual control*

Detect possible drive deterioration:

- Mechanical piece (Example: fan, housing)
- Control card and/or Power card
(example: blackened components due to overloading or starting)
- Connectors
- Wires

8.4 Breakdown search from the displayed fault

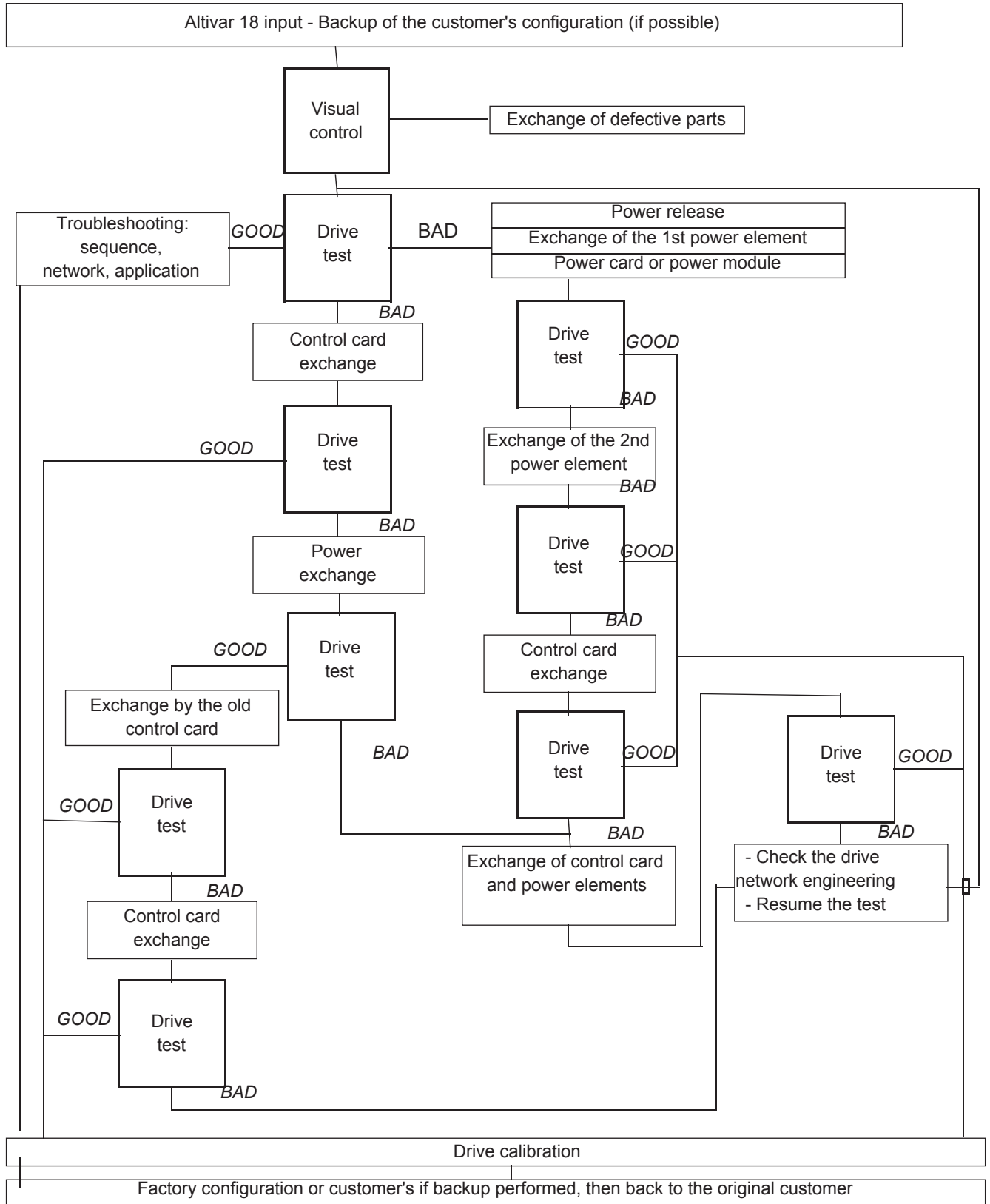
Faults that can be reset with the automatic restart function after fault clearance.

Fault	Possible cause	Clearance procedure
OHF Over-Heat Fault Drive overload	<ul style="list-style-type: none"> - too high I^2t or - too high drive temperature 	<ul style="list-style-type: none"> - Control the motor load, the drive ventilation and the environment. Wait for the cooling before starting again.
OLF Over-Load Fault Motor overload	<ul style="list-style-type: none"> - Release due to too high motor I^2t 	<ul style="list-style-type: none"> - Check the motor thermal protection adjustment. Check the motor load. Wait for the cooling before starting again.
OSF Over-voltage during steady state or acceleration	<ul style="list-style-type: none"> - Network voltage too high - Disrupted network 	<ul style="list-style-type: none"> - Check the network voltage.
USF Under-voltage	<ul style="list-style-type: none"> - Too weak network - Temporarily voltage drop - Deteriorate load resistance 	<ul style="list-style-type: none"> - Check the voltage and the voltage parameter. - Reset. - Change the load resistance.
ObF Over-voltage during deceleration	<ul style="list-style-type: none"> - Too brutal braking or driving load 	<ul style="list-style-type: none"> - Increase the deceleration duration. - Add a braking resistance if necessary. - Activate the brA function if suitable to the application.

Faults that cannot be automatically reset. The fault cause has to be suppressed before resetting by on / off operations.

Fault	Possible cause	Clearance procedure
OCF Over-current fault	<ul style="list-style-type: none"> - Short circuit or earthing at the drive output - Over-intensity in the braking resistance 	<ul style="list-style-type: none"> - With the drive disconnected, check the linking cables, the motor insulation and the coiling state. - Check the resistance choice. With the drive disconnected, check the linking cables, the resistance insulation and ohmic value.
DbF Overload of braking circuit	<ul style="list-style-type: none"> - Overstepping of the capacities of the braking circuit 	<ul style="list-style-type: none"> - Check the braking resistance choice. Check the resistance ohmic value. Verify that the drive size complies with the application.
InF Internal fault	<ul style="list-style-type: none"> - Internal fault 	<ul style="list-style-type: none"> - Check the environment (electromagnetic compatibility) - Send the drive back for control/repair.
TnF Self-setting fault	<ul style="list-style-type: none"> - Special motor - Motor power not adapted to the drive 	<ul style="list-style-type: none"> - Use the L or P law.
EEF	<ul style="list-style-type: none"> - Internal fault 	<ul style="list-style-type: none"> - Send the drive back for control/repair.

Powers from 7.5 kW to 15 kW



8.5 Powers from 0.37 to 7.5 kW – 230 V or 400 V

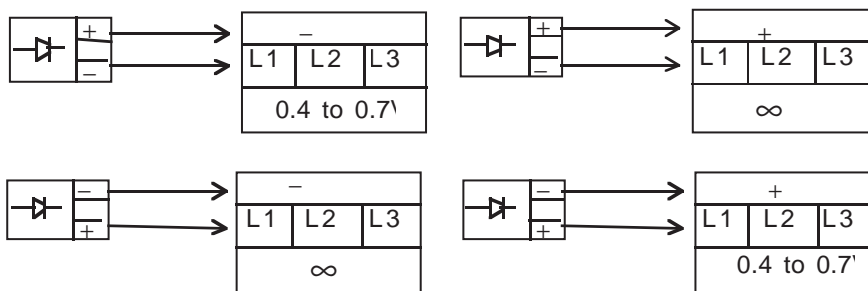
8.5.1 Rectifier bridge

The measurements have to be carried out between the input power terminals L1, L2 (single-phase) and L3 (tri-phase) and the -, + of the DC bus. The + terminal of the DC bus can always be reached on the power terminal block at PA. According to the size, the - terminal of the DC bus can be reached on the power cards and screen printed as follows:

- ATV18U09M2/18M2: welding at the left of the mark T (transmitter of the braking transistor GTR7)
- ATV18U29M2: mark - (transmitter of the braking transistor GTR7)
- ATV18U41M2/U54M2/U72M2/U90M2/D12M2: mark N
- ATV18U18N4/U29N4/41N4/U54N4/U72N4/U90N4/D12N4: mark N

Use: Digital or rotating-loop multimeter with diode test function or diode tester.

Adjust the position on diode test.



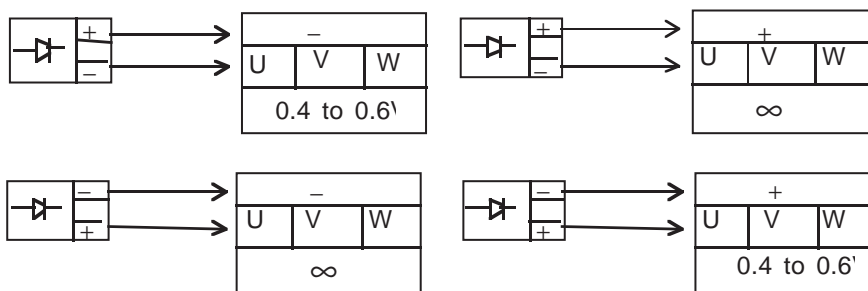
8.5.2 DC Bus

Control with an ohmmeter that there is no straight short circuit between the -, + terminals of the DC bus (see chapter 2.6.1.1).

The ohmic value is likely to change (load of condensers).

Note: If a smoothing condenser is defective the power card has to be changed.

8.5.3 Power module



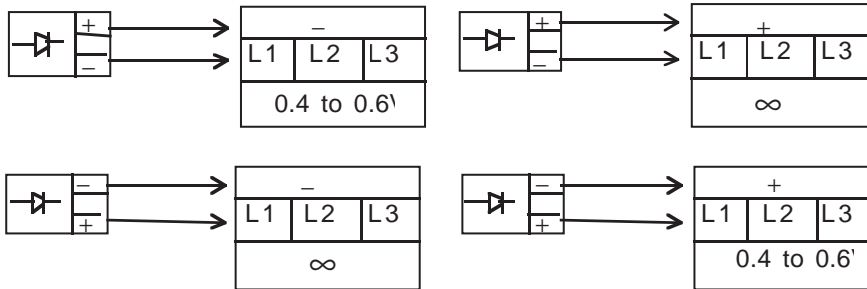
8.6 Powers 11 & 15 kW - 400 V

8.6.1 Rectifier bridge

The measurements have to be carried out between the input power terminals L1, L2 and L3 and the -, + of the DC bus. The + terminal of the DC bus can always be reached on the power terminal block at PA. The - terminal of the DC bus can be reached on the non-marked terminal (x) at the right of PB.



Use: Digital or rotating-loop multimeter with diode test function or diode tester.



8.6.2 DC Bus

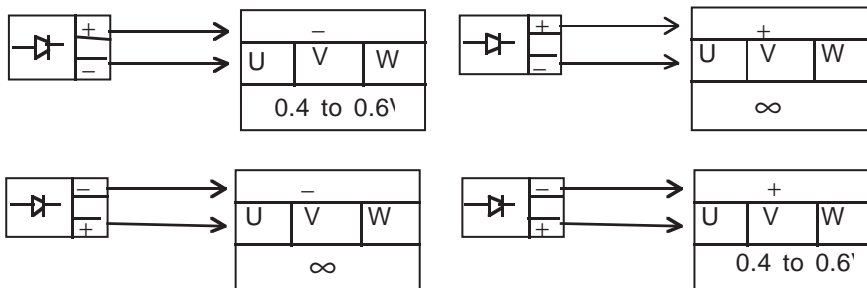
Control with an ohmmeter that there is no straight short circuit between the -, + terminals of the DC bus (see chapter 2.6.2.1).

The ohmic value is likely to change (load of condensers).

Note: If a smoothing condenser is defective the power card has to be changed.

8.6.3 Power module

The measurements have to be carried out between the motor power supply terminals U, V and W, and the -, + of the DC bus (see chapter 2.6.2.1).



9. Assistance to repair

9.1 Control of the various parameters or functions - Calibration

Drive calibration

- Use a motor of a power similar or superior to the drive power (1 calibre maximum).
- Connect the PC link additional part VW3A18104 to the drive.
- Switch on the PC and run the [SCALE18.EXE](#) software from the CD-ROM
- Follow the instructions given on the screen and carry out the drive calibration.

Drive calibration with current

- Connect the drive directly to the network without the alternostat.
- Connect the motor and connect a RMS ammeter on a motor phase.
- Follow the instructions given on the screen and carry out the drive calibration.

Drive calibration with voltage

- Supply the drive through the alternostat.
- Connect a voltmeter between L1 and L2.
- The drive is stopped, the motor should not run.
- Follow the instructions given on the screen and carry out the drive calibration.

9.2 Dismantling / Reassembly manuals for sub-assemblies and components

9.2.1 Power access (power off)

To control the power elements, the drive has to be opened to reach test points located on the power card for sizes from 1 to 4. For size 5, the power can be controlled directly on the terminals.

- Put on the anti-static strap.
- Remove the metallic "cable gland" door.
- Remove the drive housing (control card support).
- Disconnect the sheeting and the power card connector (if necessary).

9.2.2 Checking of the control card

9.2.2.1 Dismantling of the control card

- Put on the anti-static strap.
- Remove the drive housing.
- Disconnect the sheeting and the power card connector.
- Remove the control card.

9.2.2.2 Reassembly of the control card

- Adjust and screw the control card into the housing.
- Reconnect the sheeting and the power card connector.

10. Quality system

It is imperative that the repaired drive has to be sent back to the original customer. The country is responsible for the updating to the last index (excluding warning of the VVD activity) and the drive mechanical overhauling (scratches, etc.). If at all possible, the customer's adjustments will be saved. However, Schneider Electric SA cannot be liable for the adjustments carried out (security).

10.1 Repair validation procedure

Drive test

- Use a motor of the same power as the drive power (if possible) (take care of the coupling according to the voltage M2 or N4).
 - Have the speed of the motor varied by the order on all the speed range.
 - Change the rotation direction with the LI1 direct direction and LI2 opposite direction running orders for example.
 - Check the correct operation of the releasable fan according to the running status.
 - Test the logic inputs LI2, LI3, LI4.
 - Check the correct operation of the keyboard (Example: modify ACC parameter).
 - Test the defective function described by the customer.
- If the drive test is good, calibrate the drive.

10.2 Repair briefing

Supports common to all VVD products have to be used.

This briefing has to be transmitted to the customer and to DAS and must contain the following information:

- Malfunction observed by the customer.
- Product information (complete reference, version, manufacturing date, etc.).
- Malfunction observed by the technician at product reception.
- State of product historical and diagnosis.
- Tests and checks performed and results.
- Possible breakdown causes.
- Faulty and replaced components.
- Returned product configuration.

10.3 Quality reporting to DAS CI

After sending the repair briefing to DAS, RETCLI or COUNT (according to the countries) has to be informed for the DAS to manage the product quality at best.