Application Note – 10
Migrating the Xtravert to Altivar 71

Simply Smart !

brands of Schneider Electric

Telemecanique
PDL
AC Drives

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1. Overview

This application note looks at the migration from an existing PDL Xtravert drive to the Altivar 71. The application note covers the basic cabling and I/O requirements and provides the basic programming instructions required to configure the drive for simple operation.

2. Introduction

The Altivar 71 offer is Schneider Electrics proposed replacement for the Xtravert range of drives. The Altivar 71 range of drives is available from 0.37kW through to 500kW. The Xtravert and Altivar 71 offer a range of controls that provide flexibility for most process specific areas of operation. This configurability means that the Xtravert and the Altivar 71 can often be employed as a complete stand-alone process control system. The purpose of this application note is to provide the basic information and an easy step-by-step guide to assist the end user in migrating from their existing Xtravert hardware to the Altivar 71 and hopefully will achieve fast start-up for the majority of applications.

3. Dimensions

The Xtravert and the Altivar have distinct profiles. The Altivar 71 has a smaller overall footprint but differs from the Xtravert in its height to width ratio. In general this means that the Altivar replacement for Xtravert models will require more space in the horizontal plane (width). Ensure that the dimensions of the existing Xtravert and its surrounding allow sufficient space particularly in the horizontal plane for the fitting of the Altivar 71.

3.1 Dimensions Comparison Xtravert / Altivar 71

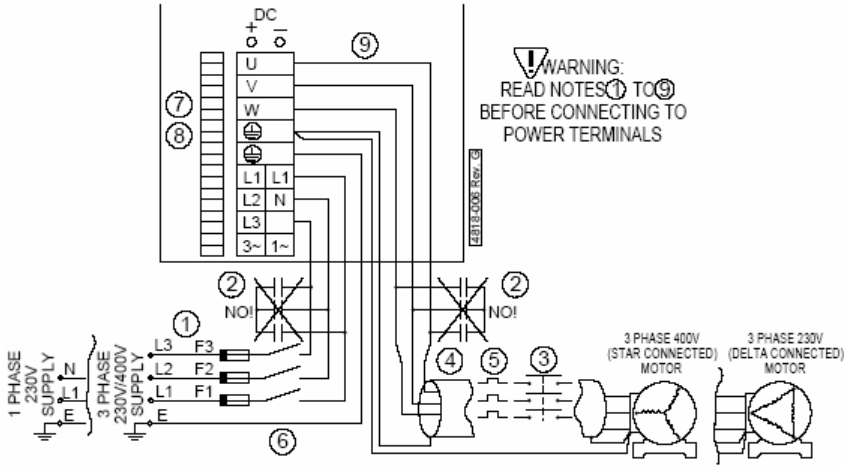
Single phase supply voltage 200...240 V 50/60 Hz

Type/Model	Height	Width	Depth
X302 (0.37kW)	281mm	96mm	216mm
ATV71H075M3 (0.37kW)	230mm	130mm	172mm
X304 (0.75kW)	281mm	96mm	216mm
ATV71HU15M3 (0.75kW)	230mm	130mm	172mm
X307 (1.5kW)	281mm	96mm	216mm
ATV71HU22M3 (1.5kW)	260mm	155mm	184mm
X309 (2.2kW)	281mm	135mm	216mm
ATV71HU30M3 (2.2kW)	260mm	155mm	184mm

3-Phase supply voltage 380…480 V 50/60 Hz

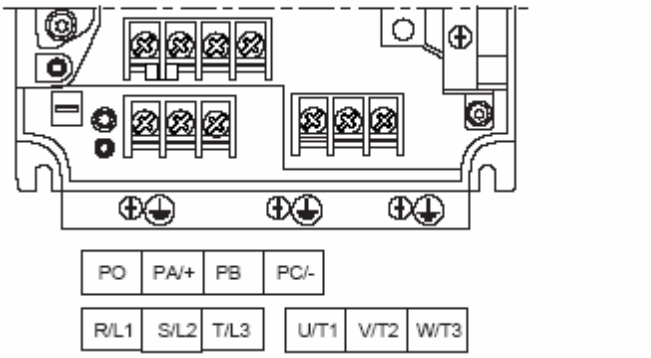
Type/Model	Height	Width	Depth
X702 (0.75kW)	281mm	96mm	216mm
ATV71H075N4 (0.75kW)	230mm	130mm	172mm
X704 (1.5kW)	281mm	96mm	216mm
ATV71HU15N4 (1.5kW)	230mm	130mm	172mm
X707 (3.0kW)	281mm	96mm	216mm
ATV71HU30N4 (3.0kW)	260mm	155mm	184mm
X709 (4.0kW)	281mm	135mm	216mm
ATV71HU40N4 (4.0kW)	260mm	155mm	184mm
X712 (5.5kW)	281mm	135mm	216mm
ATV71HU55N4 (5.5kW)	295mm	175mm	184mm
X716 (7.5kW)	281mm	135mm	216mm
ATV71HU75N4 (7.5kW)	295mm	175mm	184mm

4. Xtravert / Altivar71 mains connections



Xtravert mains connections

ATV71H 037M3, 075M3, U15M3, U22M3, U30M3, U40M3, 075N4, U15N4, U22N4, U30N4, U40N4



Altivar 71 mains connections

4.1 Xtravert / Altivar 71 mains connections comparison

Description	Xtravert		Altivar 71	
Ground terminal	⏚		⏚	
Power supply	L1	L1*	R/L1	R/L1*
	L2	N*	S/L2	S/L2*
	L3		T/L3	
Outputs to the motor	U		U/T1	
	V		V/T2	
	W		W/T3	
Output to brake resistor (+)			PA/+	(ATV71H…M3.)
Output to brake resistor			PB	(ATV71H075N4 to HC16N4)
DC bus + polarity	Spade terminal above motor outputs (see above).		PO	
DC bus - polarity	Spade terminal above motor outputs (see above).		PC/-	

- **Denotes single phase connections**

5. Xtravert / Altivar 71 control terminals

The standard Xtravert and Altivar 71 control terminals provide inputs and outputs that allow the connection of various control devices for easy integration into most control environments. There are differences between the control options available on each of the drives and these are summarised as the following

- The Altivar 71 has a programmable Analogue Input (2) that can be configured for either -10 to +10V, 0 to +10V or 4 to 20mA (the Xtravert AI2 has a 4 to 20mA only input).
- The Altivar 71's Analogue Output can be configured for either 4 to 20mA or 0 to +10V operation (the Xtravert can also can be configured for 4 to 20mA and 0 to +10V and additionally has -10 to +10V capability).
- The Altivar 71 has five programmable logic inputs as opposed to the Xtraverts four. In addition the Altivar 71 has a further sixth input that can be used as a PTC trip input or as another logic input depending on the setting of switch SW2*.

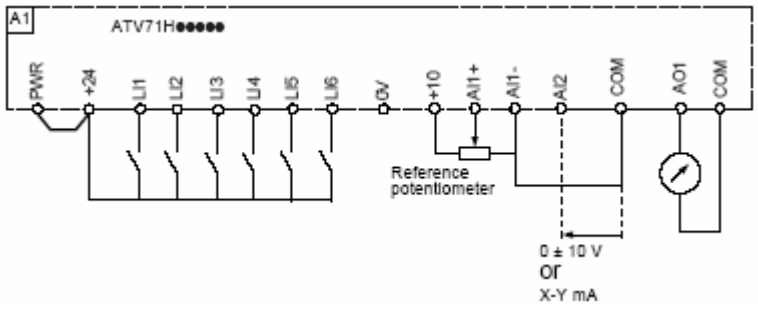
* *See section 8 (page 7)*

5.1 Xtravert / Altivar 71 control terminal comparison*

Terminal Description	Xtravert Terminal	Altivar 71 Terminal
Programmable Output Relay 1	**T1 – (N/O)** **T2 – (Common),** **T3 – (N/C)**	**R1A – (N/O)** **R1C – (Common)** **R1B – (N/C)**
Programmable Output Relay 2	**T4 – (Common)** **T5 – (N/O)**	**R2C – (Common)** **R2A – (N/O)**
Analogue Input 1	**T12 – (0V)** **T13 – (+10V)** **T14 – (Analogue input)**	**AI1- – (0V)** **+10V – (+10V)** **AI1+ – (Analogue input)**
Analogue Input 2	**T15 – (0V),** **T16 – (Analogue Input)**	**Com – (Common),** **AI2+ – (Analogue Input)**
Analogue Output	**T17 – (0V),** **T18 – (Analogue Output)**	**Com – (Common),** **AO1 – (Analogue Output)**
Programmable Input 1	**T6 – (MFI1)**	**LI1 – (Logic Input 1)**
Programmable Input 2	**T7 – (MFI2)**	**LI2 – (Logic Input 2)**
Programmable Input 3	**T8 – (MFI3)**	**LI3 – (Logic Input 3)**
Programmable Input 4	**T9 – (MFI4)**	**LI4 – (Logic Input 4)**
Programmable Input 5	**N/A**	**LI5 – (Logic Input 5)**
External Trip Input	**T10 – (External Trip)**	**LI6 – (PTC Trip or Logic Input 6)**

** For further information regarding Altivar 71 I/O specification please refer to the Appendix 20.1 (page 20)*

6. Altivar 71 control connection diagram



7. Altivar 71 2 wire control logic states

When using the Altivar 71 with 2-wire control you can select between “level” and “transition” switching logic. With the setting left at its default setting of “transition” the drive is looking for a state change (transition or edge) to initiate operation. Transition setting prevents accidental restart after a break in the power supply. In the “level” setting a logic state 0 or 1 is taken into account for run (logic 1) or stop (logic 0). You can also set the drive controls in 2 wire control for “forward priority” with forward priority selected the “forward” input always takes priority over the “reverse” input.

8. Altivar 71 logic switching

The logic input switch (SW1) is used to adapt the operation of the logic inputs to the technology of the programmable controller outputs.*

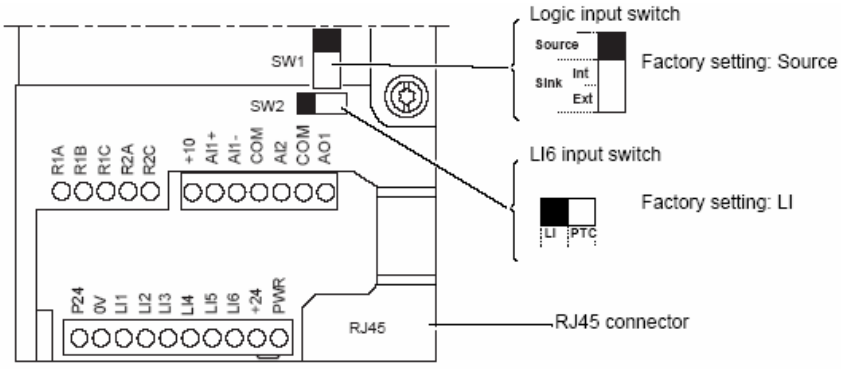
- Position the switch at Source (factory setting) if using PLC outputs using PNP transistors.

Position the switch at Sink Int or Sink Ext if using PLC outputs using NPN transistors.
To provide the same switching logic format as the Xtravert the Altivar 71 inputs should be set to source.

** For diagrammatic examples of the logic switching refer to the Appendix 20.2 (page 21)*

9. Altivar 71 logic input 6

Logic input 6 on the Altivar 71 can be set by using switch (SW2) as either another programmable logic input or a PTC trip input.



Note: The ATV71 is supplied with a link between the PWR and +24 terminals.

10. Altivar communications adaptor

The Altivar 71 comes with integrated RJ45 adaptor for connection to a suitable personal computer or notebook using the appropriate cable or blue tooth adaptor and Power Suite V2.2 or above.

11. Preparing the user settings

Prior to programming it is advisable to complete the user settings tables below.

Code	Name	Factory setting	Customer setting
tCC	[2/3 wire control]	[2 wire] (2C)	
CFG	[Macro configuration]	[Start/Stop] (StS)	
bFr	[Standard mot. freq]	[50 Hz] (50)	
nPr	[Rated motor power]	According to drive rating	
UnS	[Rated motor volt.]	According to drive rating	
nCr	[Rated mot. current]	According to drive rating	
FrS	[Rated motor freq.]	50 Hz	
nSP	[Rated motor speed]	According to drive rating	
tFr	[Max frequency]	60 Hz	
PHr	[Output Ph rotation]	ABC	
ItH	[Mot. therm. current]	According to drive rating	
ACC	[Acceleration]	3.0 s	
dEC	[Deceleration]	3.0 s	
LSP	[Low speed]	0	
HSP	[High speed]	50 Hz	

12. Functions assigned to I/O

12.1 Standard Altivar 71 I/O

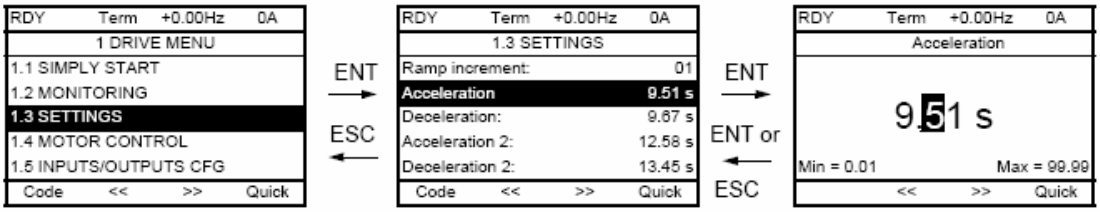
I/O	Functions assigned
LI1	
LI2	
LI3	
LI4	
LI5	
LI6	
AI1	
AI2	
AO1	
R1	
R2	

Altivar 71 optional extended I/O

I/O	Functions assigned
LI7	
LI8	
LI9	
LI10	
LI11	
LI12	
LI13	
LI14	
LO1	
LO2	
LO3	
LO4	
AI3	
AI4	
AO2	
AO3	
R3	
R4	
RP	
Encoder	

13. Programming: Example of accessing a parameter

Accessing the acceleration ramp



Note:

- To select a parameter:
  - Turn the navigation button to scroll vertically.
- To modify a parameter:
  - Use the << and >> keys (F2 and F3) to scroll horizontally and select the digit to be modified (the selected digit changes to white on a black background).
  - Turn the navigation button to modify the digit.
- To cancel the modification:
  - Press ESC.
- To save the modification:
  - Press the navigation button (ENT).

14. Xtravert to Altivar 71 parameter conversion

Navigation through the Xtravert group screen menus is managed through the Xtraverts keypad using the " ***** ", " + " and " – " keys. Navigation through the Altivar 71 can be achieved through either the drives Graphic Display Terminal or by using a personal computer/laptop with Powersuite v2.2 (or above) software using the appropriate cable. Basic settings can be configured in the Altivar 71 by using the **[1.1 SIMPLY START]** menu accessed within the **[1. DRIVE MENU]**. The **[1.1 SIMPLY START]** menu gives you direct access to configuration settings such as 2 or 3 wire control options, auto tune function, motor nameplate ratings, acceleration and deceleration rates, speed range, motor thermal current. There are also 7 macro configurations available which allow the user to speed up the configuration of functions for a specific field of application. The seven macro configurations available are:

- Start/stop (factory configuration)
- Materials handling
- General use
- Hoisting
- PID regulator
- Communication bus
- Master/slave

Selecting a macro configuration assigns the parameters in this macro configuration.

15. Simply Start

The **[1.1 SIMPLY START]** menu of the Altivar 71 can be used for fast start-up and provides the basic settings for the majority of applications. The **[1.1 SIMPLY START]** menu gives you direct access to configuration settings such as 2 or 3 wire control options, auto tune function, motor nameplate ratings, acceleration and deceleration rates, speed range, motor thermal current and macro configurations which allows the user to speed up the configuration of functions for a specific field of application. It is advisable that initially the parameters in the **[1.1 SIMPLY START]** menu are entered prior to all other settings.

16. Xtravert / Altivar 71 parameter comparison

> ***denotes parameter is accessed through a submenu structure.***

Xtravert		Altivar 71	
Screen Group A - Auxiliary Screens	A1-Local Speed Setpoint	**[1.6 Command]**	Ref.1 Channel (Fr1) = HMI (LCC)
	A2-Extended Status Screens	**[1.2 Monitoring]**	*Configurable* - Motor thermal state (tHr), Frequency ref. (FrH)
	A3-Extended Status Screens	**[1.2 Monitoring]**	*Configurable* - Motor speed (SPd)
	A4-Extended Status Screens	**[1.2 Monitoring]**	*Configurable* - Mains voltage (Uln), Motor Voltage (UOP)
Screen Group C –Comparator Screens	C1-Speed Sense Relay Upper Set Point C1- FR ON	**[1.5 Input/Outputs CFG]**	R1 Configuration (R1) > R1 Assignment (R1) = Freq. Th. attain. (SrA)
	C2-Speed Sense Relay Lower Set Point C2- FR OFF		No Direct Equivalent
	C3-Current Sense Relay Set Point C3- I SENSE	**[1.5 Input/Outputs CFG]**	R1 Configuration (R1) > R1 Assignment (R1) = I attained (CtA)
Screen Group H – Host Communication Screens	H1-Serial Communications Address H1 COMMS ADR	**[1.9 Communication]**	Modbus network (Md1) > Modbus Address (Add)
	H2-Serial Communications Timeout Selection H2 COMMS T/O	**[1.9 Communication]**	Modbus network (Md1) > Modbus time out (ttO)
Screen Group I – Input Screens	I1-Local Start/Stop-Reset Control I1 LOCAL	**[1.6 Command]**	Ref.1 Channel (Fr1) = HMI (LCC). Profile (CHCF) *must be set to* Not separ. (SIN)
	I2-Speed Reference Source I2 REF SP	**[1.6 Command]**	Ref.1 Channel (Fr1)
	I3-Alternative Speed Reference Source I3 AREF S	**[1.6 Command]**	Ref.2 Channel (Fr2)
	I4-Analogue Input 1 Format I4 AIN1		*AI1 is not configurable and is fixed at 0 to 10V*
	I5-Analogue Scaling Controls I5 A1 LO	**[1.5 Input/Outputs CFG]**	AI1 Configuration (AI1) > AI1 Assignment (AI1) > AI1 min value (UIL1)
	I6-Analogue Scaling Controls I6 A1 HI	**[1.5 Input/Outputs CFG]**	AI1 Configuration (AI1) > AI1 Assignment (AI1) > AI1 max value (UIH1)
	I7-Analogue Scaling Controls I7 A2 LO	**[1.5 Input/Outputs CFG]**	AI2 Configuration (AI2) > AI2 Assignment (AI2) > AI2 min. value (CrL2) *or* (UIL2) *selection depends on mA / voltage*

Xtravert		Altivar 71	
Screen Group I – Input Screens (cont.)	I8-Analogue Scaling Controls I8 A2 HI	**[1.5 Input/Outputs CFG]**	AI2 Configuration (AI2) > AI2 Assignment (AI2) > AI2 max. value (CrH2) *or* (UIH2) *selection depends on mA / voltage*
	I9-Multifunction Input Mode I9 I/P MODE	**[1.1 Simply Start]**	Macro configuration (CFG)
Screen Group L – Limit Screens	L1-Minimum/Maximum Speeds L1 MIN FR	**[1.3 Settings]**	Low speed (LSP)
	L2-Minimum/Maximum Speeds L2 MAX FR	**[1.3 Settings]**	High speed (HSP)
	L3-Current Limit Controls L3 I LIMIT	**[1.3 Settings]**	Current limitation (CLI)
	L4-Current Limit Controls L4 ILT T/O (Time out)	**[1.8 Fault Management]**	Torque or I lim. Detect (TID) > Trq/I limit. time out (StO)
	L5-Reverse Direction Inhibit L5 REV INHIBIT	**[1.6 Command]**	RV inhibition (Rln)
	L6-Skip Frequencies L6 SKIP 1		No Equivalent to Date
	L7-Skip Frequencies L7 SKIP 2		No Equivalent to Date
	L8-Skip Bandwidth L8 SK BW		No Equivalent to Date
	L9-Run at Minimum Frequency L9 MIN FR RUN	**[1.3 Settings]**	Low speed time out (tLS)
Screen Group M– Multi-Reference Screens	M1-Multi-Speed References M1 MREF1	**[1.3 Settings]**	Preset speed 2 (SP2)
	M2-Multi-Speed References M2 MREF2	**[1.3 Settings]**	Preset speed 3 (SP3)
	M3-Multi-Speed References M3 MREF3	**[1.3 Settings]**	Preset speed 4 (SP4)
	M4-Multi-Speed References M4 MREF4	**[1.3 Settings]**	Preset speed 5 (SP5)
	M5-Multi-Speed References M5 MREF5	**[1.3 Settings]**	Preset speed 6 (SP6)
	M6-Multi-Speed References M6 MREF6	**[1.3 Settings]**	Preset speed 7 (SP7)
	M7-Multi-Speed References M7 MREF	**[1.3 Settings]**	Preset speed 8 (SP8)

Xtravert		Altivar 71	
Screen Group N – Motor Nameplate Screens	N1-Motor Nameplate Screens N1 MTR CUR	**[1.4 Motor Control]**	Rated mot. current (NCr)
	N2-Motor Nameplate Screens N2 MTR VOLT	**[1.4 Motor Control]**	Rated motor volt. (UnS)
	N3-Motor Nameplate Screens N3 MTR FR	**[1.4 Motor Control]**	Rated motor freq. (FrS)
	N5-Motor Nameplate Screens N5 MTR RPM	**[1.4 Motor Control]**	Rated motor speed (nSP)
	N6-Motor Nameplate Screens N6 MTR COOL	**[1.8 Fault Management]**	Motor thermal prot.(tHt) > Motor protect. type (tHt)
Screen Group O– Output Screens	O1-Analogue Output 1 (AO1) Source O1 AO1 SRC	**[1.5 Input/Outputs CFG]**	AO1 Configuration (AO1) > AO1 assignment (AO1)
	O2-Analogue Output Format O2 AO1	**[1.5 Input/Outputs CFG]**	AO1 Configuration (AO1) > AO1 Type (AO1t)
	O3-Digital Outputs O3 O/P RELAY 1	**[1.5 Input/Outputs CFG]**	R1 Configuration (r1) > R1 Assignment (r1)
	O4-Digital Outputs O4 O/P RELAY 2	**[1.5 Input/Outputs CFG]**	R2 Configuration (r2) > R2 Assignment (r2)
Screen Group P – Process Control Screens	P1-Process Control Setpoint Source P1 PR SRC	**[1.7 Application Function]**	PID Regulator (PID) > Manual reference (PIM)
	P2-Process Control Feedback Source P2 FB SRC	**[1.7 Application Function]**	PID Regulator (PID) > PID feedback ass. (PIF)
	P3-Process Control PID Settings P3 Kc (Gain)	**[1.7 Application Function]**	PID Regulator (PID) > PID prop. gain (rPG)
	P4-Process Control PID Settings P4 Ti (Integ. time)	**[1.7 Application Function]**	PID Regulator (PID) > PID integral gain (rIG)
	P5-Process Control PID Settings P5 Td (Differ. time)	**[1.7 Application Function]**	PID Regulator (PID) > PID derivative gain (rdG)
	P6-Process Control PID Settings P6 ERROR	**[1.2 Monitoring]**	*Configurable* – PID error (rPE)
	P7-Feedback Sense Relay Hysteresis P7 FB RLY	**[1.7 Application Function]**	PID Regulator (PID) > Min fbk alarm (PAL) > Max fbk alarm (PAH)
Screen Group R – Rate Screens	R1-Accel/Decel Rate (Normal) R1 ACC	**[1.3 Settings]**	Acceleration (ACC)
	R2-Accel/Decel Rate (Normal) R2 DEC	**[1.3 Settings]**	Deceleration (dEC)

Xtravert		Altivar 71	
Screen Group R – Rate Screens (cont.)	R3-Alternative Accel/Decel Rates R3 AACC	**[1.3 Settings]**	Acceleration 2 (AC2)
	R4-Alternative Accel/Decel Rates R4 ADEC	**[1.3 Settings]**	Deceleration 2 (dE2)
	R5-Alternative Accel/Decel Rates R5 BRK FR	**[1.7 Application Function]**	Ramp (rPt) > Ramp 2 threshold (Frt)
	R6-Alternative Stop Deceleration Rate R6 ASTP	**[1.7 Application Function]**	Stop configuration (Stt) > Ramp divider (dCF)
	R7-S-Curve Time Constant R7 S-CURVE	**[1.7 Application Function]**	Ramp (rPt) > Ramp type (rPt) = S ramp (S)
Screen Group S – Start/Stop Screens	S1-Starting Mode S1 STR MODE	**[1.7 Application Function]**	Ramp (rPt) > Ramp type (rPt)
	S2-Stopping Mode S2 STP MODE	**[1.7 Application Function]**	Stop configuration (Stt) > Type of stop (Stt)
	S3-Torque Boost Voltage at Zero Speed S3 BOOST		*Not applicable (ATV 71 is a vector drive)*
	S4-DC Stopping Controls S4 DC LEVEL	**[1.7 Application Function]**	Auto DC injection (AdC) > Auto DC inj. level 1 (SdC1)
	S5-DC Stopping Controls S5 DC TIME	**[1.7 Application Function]**	Auto DC injection (AdC) > Auto DC inj. time 1 (tdC1)
	S6-DC Heating Voltage S6 DC HEAT		No Equivalent
	S7-Low Voltage Trip Enable/Disable S7 HV LOW TRIP	**[1.8 Fault Management]**	Undervoltage mgt (Usb) > UnderV prevention (StP)
	S8-Auto Fault Reset S8 AUTO RESET	**[1.8 Fault Management]**	Automatic restart (Atr)
Screen Group X – Xtravert Tuning Screens	X1-Dynaflux Minimum Flux Level X1 MIN FLUX	**[1.3 Settings]**	Motor fluxing (FLU)
	X2-Torque Boost Mode X2 AUTOBOOST		*Not applicable (ATV 71 is a vector drive)*
	X3-Slip Frequency X3 SLIP FR	**[1.4 Motor Control]**	Slip compensation (SLP)
	X4-Current Limit Slip X4 ILT SLIP		*Calculated by drive*
	X5-Voltage Limit Slip X5 VLT SLIP		*Calculated by drive*
	X6-No Load Damping X6 DAMPING		Not applicable
	X7-Modulation Type X7 SWITCH FR	**[1.4 Motor Control]**	Switching freq. (SFr)
	X8-Regeneration Mode X8 REGEN	**[1.7 Application Function]**	Ramp (rPt) > Dec ramp adapt. (brA)

Xtravert		Altivar 71	
Screen Group Y – Menu Option Screens	Y1-Language Selection Y1 ENGLISH	**[5. Language]**	*Select Language*
	Y2-Initialisation Y2 INITIALISE	**[1.12 Factory Settings]**	Go to factory settings (GFS)
Screen Group Z – Commissioning Screens	Z-Commissioning Screens Z COMMISSION	**[4. Password]**	Status (CSt) *The drive can be locked by a password*
	Z2-Software and Hardware Revisions X504 3P 230V 4A Z2 S/W1.1 H/W1.1	**[1.11 Identification]**	*Identifies the drive type, optional hardware and software versions*
	Z3-Analogue Input 1 (AIN1) Status Z3 AIN1	**[1.2 Monitoring]**	I/O Map (IOM) > Analogue inputs image (AIA)
	Z4-Analogue Input 2 (AIN2) Status Z4 AIN2	**[1.2 Monitoring]**	I/O Map (IOM) > Analog inputs image (AIA)
	Z5-Analogue Output 1 (AO1) Status Z5 AO1	**[1.2 Monitoring]**	I/O Map (IOM) > Analog outputs image (AOA)
	Z6-Multifunction Input Status Z6 MFI:0000 X	**[1.2 Monitoring]**	I/O Map (IOM) > Logic input map (LIA)
	Z7-Output Relay Status Z7 RLY:1=X0 2=0	**[1.2 Monitoring]**	I/O Map (IOM) > Logic output map (LOA)

ATTENTION!! Please note that the above Altivar 71 parameters suggested are approximate equivalents of the Xtravert parameters and may not have the identical functionality associated with the original Xtravert parameters.

17. Programming the Altivar 71

Once the Altivar 71 has been mounted and the wiring has been completed the drive is ready for programming*. Throughout the programming stage it is advisable that you refer to the programming manual. Before powering up ensure that the run command is not present. At first power up the drive will automatically display **[5. LANGUAGE]** menu. Once a language has been selected the drive display will then switch to **[2. ACCESS LEVEL]**. Access levels are:-

- **BASIC –** Access is limited to 5 menus only, and access to 6 submenus only in the **[1. DRIVE MENU]** menu. A single function can be assigned to each input.
- **STANDARD –** This is the factory-set level. Provides access to 6 menus only, and access to all submenus in the **[1. DRIVE MENU]** menu. A single function can be assigned to each input.
- **ADVANCED –** Access to all menus and submenus. Several functions can be assigned to each input.
- **EXPERT –** Access to all menus and submenus as for the [ADVANCED] level, and access to additional parameters. Several functions can be assigned to each input.

Select the access level as required. Once the access level has been selected the display will switch to the [1. DRIVE MENU] and the [1.1 SIMPLY START] menu will be highlighted.

* *For a description of the Graphic Display Terminal please refer to Appendix 20.4 (page 22)*

18. Typical Xtravert to Altivar parameter conversions:

The following examples are typical applications that highlight the differences between the Xtravert and Altivar 71. It is assumed that the operating frequency is 0 to 50Hz in all cases and that all factory default* values that do not require adjustment have been ignored.

** For information regarding factory default settings please refer to Appendix 20.3 (page 21)*

18.1 Application example 1: Xtravert 3 wire standard control with direction invert

*> **denotes parameter is accessed through a submenu structure.***

Xtravert		Altivar 71	
Screen Group I – Input Screens	I9-Multifunction Input Mode I9 I/P MODE = 01	**[1.1 Simply Start]**	2/3 wire control (tCC) = 3 wire (3C)
	No Equivalent	**[1.1 Simply Start]**	Macro configuration (CFG) = Start/Stop (StS)
	No Equivalent	**[1.1 Simply Start]**	Rated motor power (nPr) = Nameplate
Screen Group N – Motor Nameplate Screens	N2-Motor Nameplate Screens N2 MTR VOLT = Nameplate	**[1.1 Simply Start]**	Rated motor volt. (UnS) = Nameplate
	N1-Motor Nameplate Screens N1 MTR CUR = Nameplate	**[1.1 Simply Start]**	Rated mot. current (nCr) = Nameplate
	N3-Motor Nameplate Screens N3 MTR FR = Nameplate	**[1.1 Simply Start]**	Rated motor freq. (FrS) = Nameplate
	N5-Motor Nameplate Screens N5 MTR RPM = Nameplate	**[1.1 Simply Start]**	Rated motor speed (nSP) = Nameplate
	No Equivalent	**[1.1 Simply Start]**	Mot. therm. Current (ItH) = Nameplate (rated motor current)
Screen Group R – Rate Screens	R1-Accel/Decel Rate (Normal) R1 ACC	**[1.1 Simply Start]**	Acceleration (ACC)
	R2-Accel/Decel Rate (Normal) R2 DEC	**[1.1 Simply Start]**	Deceleration (dEC)
Screen Group L – Limit Screens	L1-Minimum/Maximum Speeds L1 MIN FR = 0Hz	**[1.1 Simply Start]**	Low speed (LSP) = 0Hz
	L2-Minimum/Maximum Speeds L2 MAX FR = 50Hz	**[1.1 Simply Start]**	High speed (HSP) = 50Hz

Xtravert		Altivar 71	
	No Equivalent	**[1.7 Application Function]**	Stop configuration (Stt) > Fast stop assign (FSt) = LI4
	No Equivalent	**[1.7 Application Function]**	Stop configuration (Stt) > Ramp divider (dCF) = 1
	No Equivalent	**[1.8 Fault Management]**	External fault (EfF) > External fault ass. (EtF) = LI5

An alternative stop function in the Altivar 71 is set by accessing the **[1.7 Application Function]** menu and the **Stop Configuration** submenu and setting a logic input up for **Fast stop assign** (LI4 in the above example). The **Ramp divider** function is a coefficient value that is used to divide the deceleration rate (dEC) to provide a faster stopping time if required. Finally an external trip function can be programmed from the **[1.8 Fault Management]** menu by assigning a logic input (LI5 in the above example) to the **External fault** function.

18.1.1 Xtravert / Altivar 71 I/O comparison for 3 wire stand. control with direction invert

Xtravert Inputs	Function	Altivar 71 Inputs	Function
MFI 1	STOP	**LI1**	STOP
MFI 2	START	**LI2**	FORWARD
MFI 3	A/STOP	**LI4**	A/STOP
MFI 4	INVERT DIRECTION	**LI3**	REVERSE
XTRIP	EXT. TRIP	**LI5**	EXTERNAL FAULT

Note: The default speed reference for the Xtravert is “local” and the default speed reference for the Altivar 71 is “analogue input 1”. The “invert direction” command on the Xtravert will override a “start” (forward) command whereas the Altivar 71 logic doesn’t have directional priority in 3-wire control mode.

18.2 Application Example 2: Xtravert multi-reference 3 wire control

> ***denotes parameter is accessed through a submenu structure.***

Xtravert		Altivar 71	
Screen Group I – Input Screens	I9-Multifunction Input Mode I9 I/P MODE = 08	**[1.1 Simply Start]**	2/3 wire control (tCC) = 3 wire (3C)
	No Equivalent	**[1.1 Simply Start]**	Macro configuration (CFG) = M. handling (HdG)
	No Equivalent	**[1.1 Simply Start]**	Rated motor power (nPr) = Nameplate
Screen Group N – Motor Nameplate Screens	N2-Motor Nameplate Screens N2 MTR VOLT = Nameplate	**[1.1 Simply Start]**	Rated motor volt. (UnS) = Nameplate
	N1-Motor Nameplate Screens N1 MTR CUR = Nameplate	**[1.1 Simply Start]**	Rated mot. current (nCr) = Nameplate
	N3-Motor Nameplate Screens N3 MTR FR = Nameplate	**[1.1 Simply Start]**	Rated motor freq. (FrS) = Nameplate

Xtravert		Altivar 71	
Screen Group N – Motor Nameplate Screens (cont.)	N5-Motor Nameplate Screens N5 MTR RPM = Nameplate	**[1.1 Simply Start]**	Rated motor speed (nSP) = Nameplate
	No Equivalent	**[1.1 Simply Start]**	Mot. therm. Current (ItH) = Nameplate (rated motor current)
Screen Group R – Rate Screens	R1-Accel/Decel Rate (Normal) R1 ACC	**[1.1 Simply Start]**	Acceleration (ACC)
	R2-Accel/Decel Rate (Normal) R2 DEC	**[1.1 Simply Start]**	Deceleration (dEC)
Screen Group L – Limit Screens	L1-Minimum/Maximum Speeds L1 MIN FR = 0Hz	**[1.1 Simply Start]**	Low speed (LSP) = 0Hz
	L2-Minimum/Maximum Speeds L2 MAX FR = 50Hz	**[1.1 Simply Start]**	High speed (HSP) = 50Hz
Screen Group M– Multi-Reference Screens	M1-Multi-speed References M1 MREF1 = *speed* Hz		*Preset speed 1 is the Reference (1) speed Default = AI1*
	M2-Multi-speed References M2 MREF2 = *speed* Hz	**[1.7 Application Function]**	Preset speeds (PSS) > Preset speed 2 (SP2) = *required speed in* Hz
	M3-Multi-speed References M3 MREF3 = *speed* Hz	**[1.7 Application Function]**	Preset speeds (PSS) > Preset speed 3 (SP3) = *required speed in* Hz
	M4-Multi-speed References M4 MREF4 = *speed* Hz	**[1.7 Application Function]**	Preset speeds (PSS) > Preset speed 4 (SP4) = *required speed in* Hz
	M5-Multi-speed Reference M5 MREF5 = *speed* Hz	**[1.7 Application Function]**	Preset speeds (PSS) > Preset speed 5 (SP5) = *required speed in* Hz
	M6-Multi-speed References M6 MREF6 = *speed* Hz	**[1.7 Application Function]**	Preset speeds (PSS) > Preset speed 6 (SP6) = *required speed in* Hz
	M7-Multi-speed References M7 MREF7 = *speed* Hz	**[1.7 Application Function]**	Preset speeds (PSS) > Preset speed 7 (SP7) = *required speed in* Hz
		[1.7 Application Function]	Preset speeds (PSS) > Preset speed 8 (SP8) = *required speed in* Hz

The **Preset speeds** function on the Altivar 71 is enabled via the **M. handling** (material handling) **Macro configuration,** which is set in the **[1.1 Simply Start]** menu. The logic inputs are automatically assigned for forward, reverse, stop and preset speed inputs. The preset speed selection logic is shown in the tables on page 19 section 18.2.2.

18.2.1 Xtravert / Altivar 71 I/O comparison for multi-reference 3 wire control

Xtravert Inputs	Function	Altivar 71 Inputs	Function
MFI 1	MULTI-SPEED REF.	**LI4**	2 PRESET SPEEDS
MFI 2	MULTI-SPEED REF.	**LI5**	4 PRESET SPEEDS
MFI 3	A/STOP	**LI1**	STOP
MFI 4	MULTI-SPEED REF.	**LI6**	8 PRESET SPEEDS
XTRIP	EXT. TRIP		No Logic Input Assignable (requires Extended I/O)
	No Equivalent	**LI2**	FORWARD
	No Equivalent	**LI3**	REVERSE

18.2.2 Xtravert / Altivar speed selection logic tables comparison

SCREEN	TITLE	SPECIAL FUNCTIONS	MULTI-REFERENCE INPUTS		
			MFI1 (T6) X	MFI2 (T7) Y	MFI4 (T9) Z
	STOP		O	O	O
M1	MREF1	INCH1	O	O	X
M2	MREF2	INCH2	O	X	O
M3	MREF3	INCH3	O	X	X
M4	MREF4	MOTORPOT MIN SPEED	X	O	O
M5	MREF5	MOTORPOT MAX SPEED	X	O	X
M6	MREF6		X	X	O
M7	MREF7		X	X	X

O = Open, X = Closed

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Xtravert multi-speed logic chart

16 speeds LI (PS16)	8 speeds LI (PS8)	4 speeds LI (PS4)	2 speeds LI (PS2)	Speed reference
0	0	0	0	Reference (1)
0	0	0	1	SP2
0	0	1	0	SP3
0	0	1	1	SP4
0	1	0	0	SP5
0	1	0	1	SP6
0	1	1	0	SP7
0	1	1	1	SP8
1	0	0	0	SP9
1	0	0	1	SP10
1	0	1	0	SP11
1	0	1	1	SP12
1	1	0	0	SP13
1	1	0	1	SP14
1	1	1	0	SP15
1	1	1	1	SP16

Altivar 71 multi-speed logic chart

Please note that speed preset input logic state 0, 0, 0 for the Xtravert is equivalent to a stop command where as the same speed preset input logic state for the Altivar 71 switches the drive to Reference (1) Default = AI1.

19. Xtravert / Altivar 71 parameter units comparison

During the program conversion process it is important to be aware of the differences between the drives in regards to the units in which each of the drives parameters are configured in. The differences are an important consideration and some examples are outlined below.

Xtravert parameter	Typical unit	Altivar 71 parameter	Typical unit
AIX - Scaling	-150/+150 Hz	**AIX – Scaling**	0/20mA or 1/10VDC
Acceleration	5.0Hz/sec	**Acceleration**	3.0sec (0 – 50Hz)
Deceleration	5.0Hz/sec	**Deceleration**	3.0sec (0 – 50Hz)
Alt. Accel. Rate	10Hz/sec	**Acceleration 2**	5.0sec (0 – 50Hz)
Alt. Decel. Rate	10Hz/sec	**Deceleration 2**	5.0sec (0 – 50Hz)

20. Appendix

20.1 Altivar 71 integrated I/O specification

Arrangement, characteristics and functions of the control terminals

Terminals	Function	Electrical characteristics
R1A R1B R1C	Common point C/O contact (R1C) of programmable relay R1	• minimum switching capacity: 3 mA for 24 V ⎓ • maximum switching capacity on resistive load (cos φ = 1): 5 A for 250 V ∿ or 30 V ⎓ • maximum switching current on inductive load (cos φ = 0.4 L/R = 7 ms): 2 A for 250 V ∿ or 30 V ⎓ • reaction time: 7 ms ± 0.5 ms • service life: 100,000 operations at max. switching power
R2A R2C	N/O contact of programmable relay R2	

+10	+ 10 V ⎓ power supply for reference potentiometer 1 to 10 kΩ	• + 10 V ⎓ (10.5 V ⎓ ± 5V) • 10 mA max.
AI1+ AI1 -	Differential analog input AI1	• -10 to +10 V ⎓ (max. safe voltage 24 V ⎓) • reaction time: 2 ms ± 0.5 ms, 11-bit resolution + 1 sign bit • accuracy ± 0.6% for a Δθ = 60°C, linearity ± 0.15%, of max. value
COM	Analog I/O common	0V
AI2	Depending on software configuration: Analog voltage input or Analog current input	 • analog input 0 to +10 V⎓ (max. safe voltage 24 V ⎓), impedance 30 kΩ or • analog input X - Y mA, X and Y can be programmed from 0 to 20 mA • impedance 250 Ω • reaction time: 2 ms ± 0.5 ms • 11-bit resolution, accuracy ± 0.6% for a Δθ = 60°C, linearity ± 0.15%, of max. value
COM	Analog I/O common	0V
AO1	Depending on software configuration: Analog voltage output or Analog current output	 • analog output 0 to +10 V⎓, min. load impedance 470 Ω or • analog output X - Y mA, X and Y can be programmed from 0 to 20 mA • max. load impedance 500 Ω • 10-bit resolution, reaction time: 2 ms ± 0.5 ms • accuracy ± 1% for a Δθ = 60°C, linearity ± 0.2%, of max. value

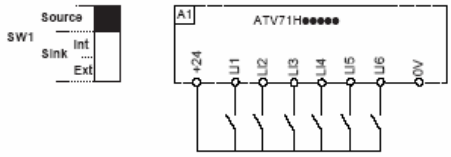
P24	External +24V⎓ control power supply	• +24 V ⎓ (min. 19 V ⎓, max. 30 V ⎓) • power 30 Watts
0V	Logic I/O common	
LI1 LI2 LI3 LI4 LI5	Programmable logic inputs	• +24 V ⎓ (Max. 30 V ⎓) • impedance 3.5 kΩ • reaction time: 2 ms ± 0.5 ms
LI6	Depending on the position of the SW2 switch. - Programmable logic input or - Input for PTC probes	 SW2 switch on LI (factory setting) • same characteristics as logic inputs LI1 to LI5 or SW2 switch on PTC • trip threshold 3 kΩ, reset threshold 1.8 kΩ • short-circuit detection threshold < 50 Ω

SW1 switch	State 0	State 1
Source (factory setting)	< 5 V ⎓	> 11 V ⎓
Sink Int or Sink Ext	> 16 V ⎓	< 10 V ⎓

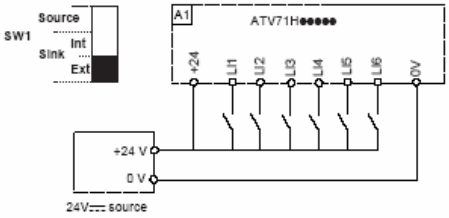
+24	Logic input power supply	SW1 switch in Source or Sink Int position • +24 V ⎓ output (min. 21 V ⎓, max. 27 V ⎓), protected against short-circuits and overloads • max. current available for customers 200 mA SW1 switch in Sink Ext position • inputs for external +24 V ⎓ power supply for the logic inputs
PWR	Power Removal safety function input When PWR is not connected to the 24V, the motor cannot be started (compliance with safety standard EN954-1 and IEC/EN61508)	• 24 V ⎓ power supply (max. 30 V ⎓) • impedance 1.5 kΩ • state 0 if < 2V , state 1 if > 17V

20.2 Altivar 71 logic switching examples

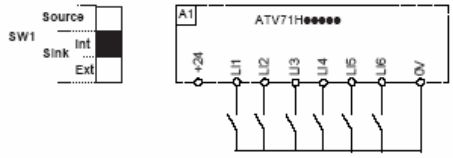
- SW1 switch on the "Source" position



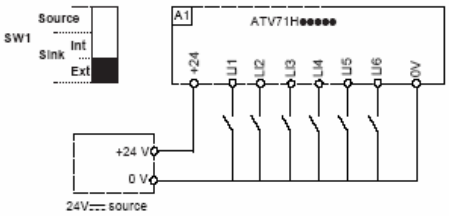
- SW1 switch on the "Source" position and use of an external power supply for the LIs



- SW1 switch on the "Sink Int" position



- SW1 switch on the "Sink Ext" position



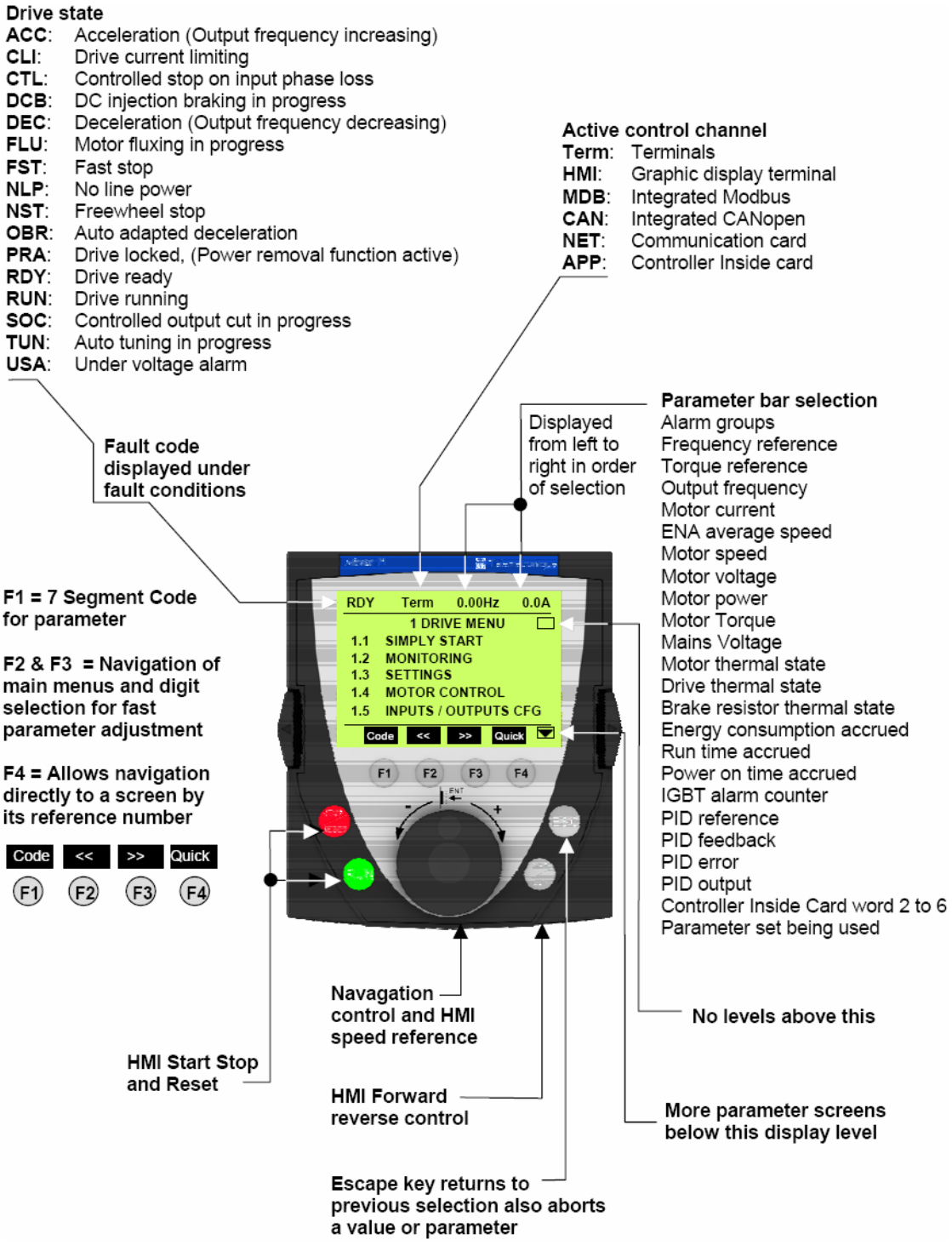
When the SW1 switch is on "Sink Int" or "Sink Ext", the common must never be connected to ground or earth, as there is then a risk of accidental starting on the first insulation fault.

20.3 Altivar 71 factory settings

The Altivar 71 is factory-set for the most common operating conditions:

- Macro-configuration: Start/Stop
- Motor frequency: 50Hz
- Constant torque application with sensorless flux vector control
- Normal stop mode on deceleration ramp
- Stop mode in the event of a fault: freewheel
- Linear, acceleration and deceleration ramps: 3 seconds
- Low speed: 0Hz
- High speed: 50Hz
- Motor thermal current = rated drive current
- Standstill injection braking current = 0.7 X rated drive current, for 0.5 seconds
- No automatic restarts after a fault
- Switching frequency 2.5kHz or 4kHz depending on drive rating
- Logic inputs: LI1: forward, LI2: reverse (2 operating directions), 2-wire control on transition, LI3,LI4,LI5,LI6: inactive (not assigned)
- Analogue inputs: AI1: speed reference 0 +/-10V, AI2: 0-20mA inactive (not assigned)
- Relay R1: The contact opens in the event of a fault (or drive off)
- Relay R2: inactive (not assigned)
- Analogue output AO1: 0-20mA, motor frequency

20.4 Graphic display terminal overview



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