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PDL
AC Drives

		Title		Date:	**14-Jul-06**
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1. Overview

This application note looks at the migration from an existing PDL Elite series 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 series of drives is Schneider Electrics upgraded replacement for the Elite series of drives to 500kW. The Altivar 71 range of drives is available from 0.37kW through to 500kW and offers a range of controls that provide flexibility for most process specific areas of operation. This configurability means that 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 user in migrating from their existing Elite hardware and standard software setup to the Altivar 71 and achieve fast application start-up.

For Elite series drives with Vysta installed, please consult a Schneider Electric Applications engineer for upgrade and migration options.

3. Dimensions

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

3.1 Dimensions Comparison Elite / Altivar 71

Elite (Constant Torque) 3-Phase supply voltage 380…480 V 50/60 Hz
Variable Torque applications are now covered by the ATV61.

Type/Model	Height	Width	Depth
E002 (0.75kW)	430mm	139mm	262mm
ATV71H075N4 (0.75kW)	230mm	130mm	175mm
E006 (3kW)	430mm	139mm	262mm
ATV71HU30N4 (3.0kW)	260mm	155mm	187mm
E010 (4kW)	430mm	139mm	262mm
ATV71HU40N4 (4.0kW)	260mm	155mm	187mm
E012 (5.5kW)	430mm	139mm	262mm
ATV71HU55N4 (5.5kW)	295mm	175mm	187mm
E018 (7.5kW)	430mm	139mm	262mm
ATV71HU75N4 (7.5kW)	295mm	175mm	187mm
E022 (11kW)	430mm	139mm	262mm
ATV71HD11N4 (11kW)	295mm	210mm	213mm
E031 (15kW)	430mm	279mm	262mm
ATV71HD15N4 (15kW)	400mm	230mm	213mm
E038 (18.5kW)	430mm	279mm	262mm
ATV71HD18N4 (18.5kW)	400mm	230mm	213mm
E046 (22kW)	430mm	279mm	262mm
ATV71HD22N4 (22kW)	420mm	240mm	236mm
UE060C54 (30kW)	970mm	347mm	313mm
ATV71HD30N4 (30kW)	550mm	240mm	266mm
UE075C54 (37kW)	970mm	347mm	313mm
ATV71HD37N4 (37kW)	550mm	240mm	266mm
UE090C54 (45kW)	970mm	347mm	313mm
ATV71HD45N4 (45kW)	630mm	320mm	290mm
UE115C54 (55kW)	970mm	347mm	313mm
ATV71HD55N4 (55kW)	630mm	320mm	290mm
UE140C54 (75kW)	970mm	347mm	290mm
ATV71HD75N4 (75kW)	630mm	320mm	290mm
UE170C54 (90kW)	1426mm	545mm	405mm
ATV71HD90N4 (90kW)	920mm	320mm	377mm
UE205C54 (110kW)	1426mm	545mm	405mm
ATV71HC11N4 (110kW)	1022mm	360mm	377mm
UE250C54 (132kW)	1426mm	545mm	405mm
ATV71HC13N4 (132kW)	1190mm	340mm	377mm
UE305C54 (160kW)	1426mm	965mm	405mm
ATV71HC16N4 (160kW)	1190mm	440mm	377mm
UE370C54 (200kW)	1426mm	965mm	405mm
ATV71HC20N4 (200kW)	1190mm	595mm	377mm
UE440C54 (250kW)	1426mm	965mm	405mm
ATV71HC25N4 (250kW)	1190mm	595mm	377mm
UE540C54 (315kW)	1426mm	965mm	405mm
ATV71HC31N4 (315kW)	1390mm	890mm	377mm
UE620C54 (355kW)	1426mm	1385mm	405mm
ATV71HC40N4 (355kW)	1390mm	890mm	377mm
UE700C54 (400kW)	1426mm	1385mm	405mm
ATV71HC40N4 (400kW)	1390mm	890mm	377mm

4. Elite / Altivar71 mains connections
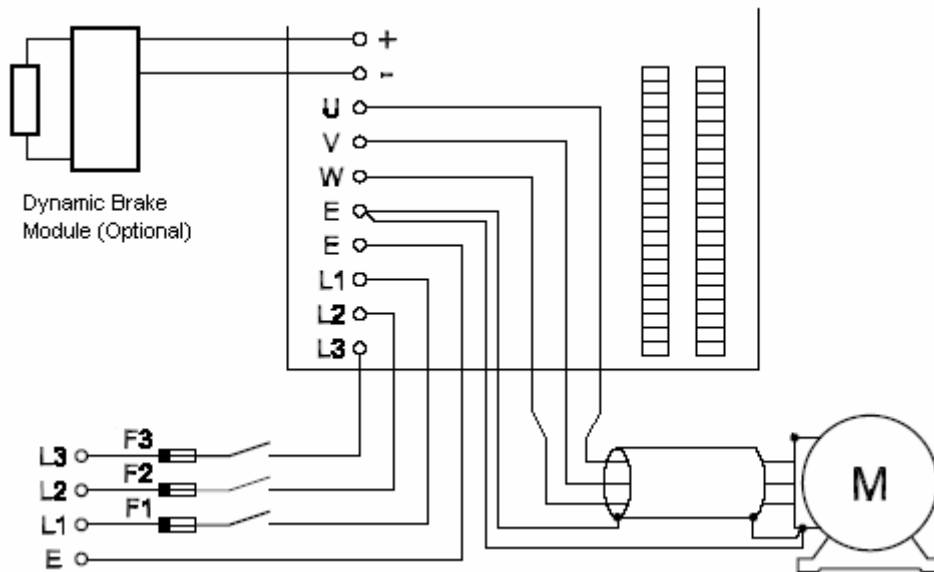
Fig 1. **Elite mains connections**

ATV71H 037M3, 075M3, U15M3, U22M3, U30M3, U40M3,
075N4, U15N4, U22N4, U30N4, U40N4
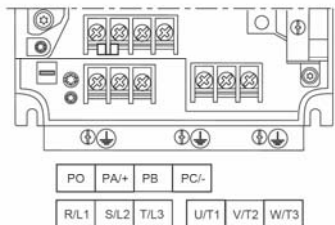
ATV71H	Maximum wire size		Tightening torque
	mm²	AWG	Nm (lb.in)
037M3, 075M3, U15M3, 075N4, U15N4, U22N4	2,5	14	1,2 (10.6)
U22M3, U30M3, U40M3, U30N4, U40N4	6	8	1,2 (10.6)

ATV71H U55M3, U75M3, D11M3X, D15M3X,
U55N4, U75N4, D11N4, D15N4, D18N4
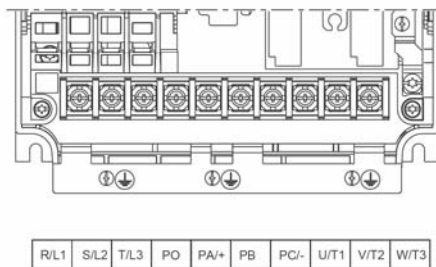
ATV71H	Maximum wire size		Tightening torque
	mm²	AWG	Nm (lb.in)
U55M3, U55N4, U75N4	10	6	2 (17.7)
U75M3, D11N4	16	4	2,4 (21)
D11M3X, D15M3X, D15N4, D18N4	35	1	2,4 (21)

ATV71H D18M3X, D22M3X, D30M3X, D37M3X, D45M3X,
D22N4, D30N4, D37N4, D45N4, D55N4, D75N4
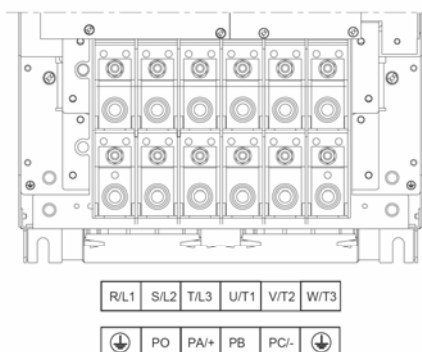
ATV71H	Maximum wire size		Tightening torque
	mm²	AWG	Nm (lb.in)
D18M3X, D22M3X, D22N4, D30N4, D37N4	50	1/0	6 (53)

ATV71H	Maximum wire size		Tightening torque
	mm²	kcmils	Nm (lb.in)
D30M3X, D37M3X, D45M3X, D45N4, D55N4, D75N4	120	350	19 (168)

Fig 2. **Altivar 71 mains connections**

4.1 Elite / Altivar 71 mains connections comparison

Description	Elite	Altivar 71
Ground terminal	⏚	⏚
Power supply	L1	R/L1
	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	+	PO
DC bus - polarity	-	PC/-

5. Elite / Altivar 71 control terminals

Fig 3. Elite control connections

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

Fig 4. ATV71 control connections

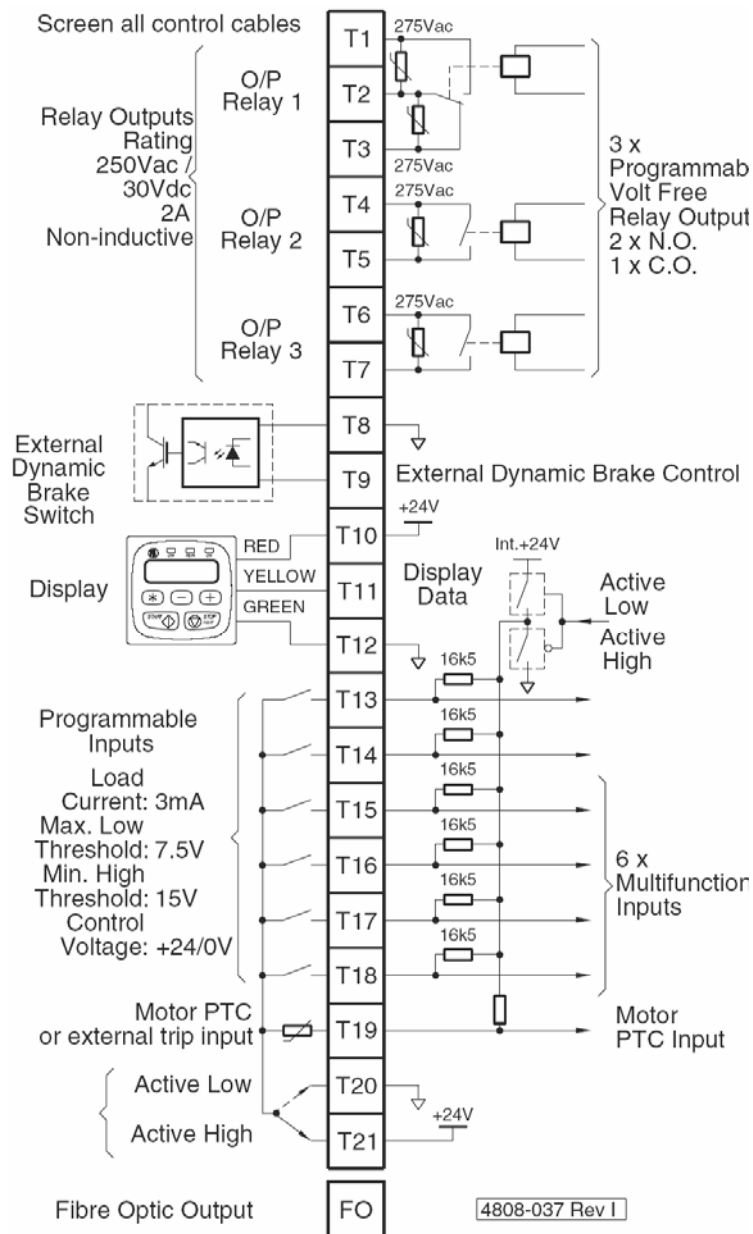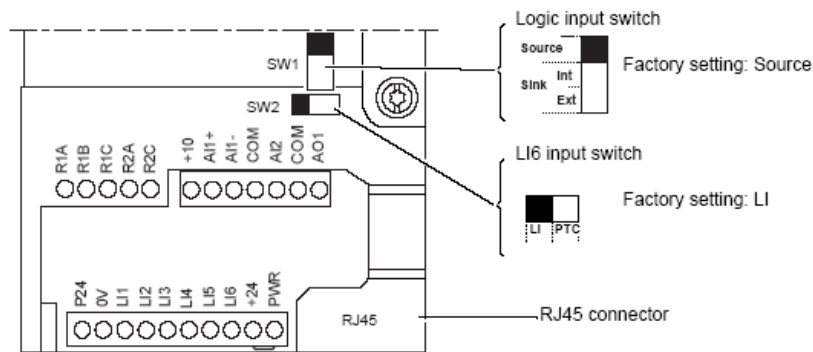The standard Elite and Altivar 71 control terminals provide inputs and outputs that allow the connection of various control devices for easy integration into most control environments.
There are differences between the control options available on each of the drives and these are summarised as the following.

- The Altivar 71 programmable Analogue Input (1) can be configured for either 0 to +10V, +/-10V (the Elite AI1 has 0 –10V, +/-10V, 0 to 20mA or 4 to 20mA options as well).
- The Altivar 71 programmable Analogue Input (2) can be configured for either 0 to +10V, +/-10V or scaled between 0 to 20mA (the Elite AI2 is the same as its AI1 input).
- The Altivar 71's Analogue Output can be configured for either 0 to 20mA or 0 to +10V operation (the Elite has 2 Analogue Outputs and can be configured for 0 – 20mA, 4 to 20mA, 0 to +10V and +/-10V capability).

The Altivar 71 has five programmable logic inputs, the Elite has six plus a PTC trip input. 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)*

- The ATV71 I/O count can be extended via an option card. Elite Series cannot.

5.1 Elite / Altivar 71 control terminal comparison

Terminal Description	Elite 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)
Programmable Output Relay 3	T6 – (Common) T7 – (N/O)	N/A
Analogue Input 1	T25 – (Common) T26 – (Analogue input)	AI1- – (0V) +10V – (+10V) AI1+ – (Analogue input)
Analogue Input 2	T25 – (Common) T27 – (Analogue input)	Com – (Common), AI2+ – (Analogue Input)
Analogue Output 1	T22 – (Common) T23 – (Analogue Output)	Com – (Common), AO1 – (Analogue Output)
Analogue Output 2	T22 – (Common) T24 – (Analogue Output)	N/A
Programmable Input 1	T13 – (MFI1)	LI1 – (Logic Input 1)
Programmable Input 2	T14 – (MFI2)	LI2 – (Logic Input 2)
Programmable Input 3	T15 – (MFI3)	LI3 – (Logic Input 3)
Programmable Input 4	T16 – (MFI4)	LI4 – (Logic Input 4)
Programmable Input 5	T17 – (MFI5)	LI5 – (Logic Input 5)
Programmable Input 5	T18 – (MFI6)	N/A
External Trip Input	T19 – (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
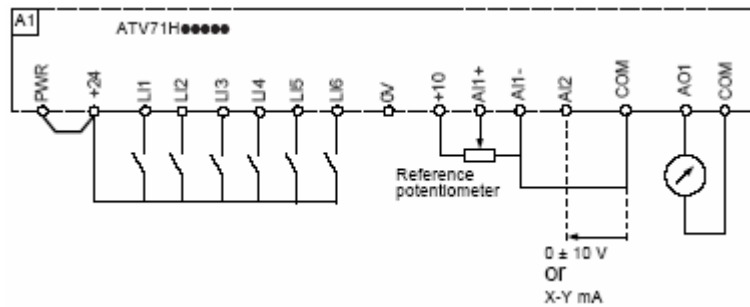
7. Altivar 71 - 2 wire control logic states

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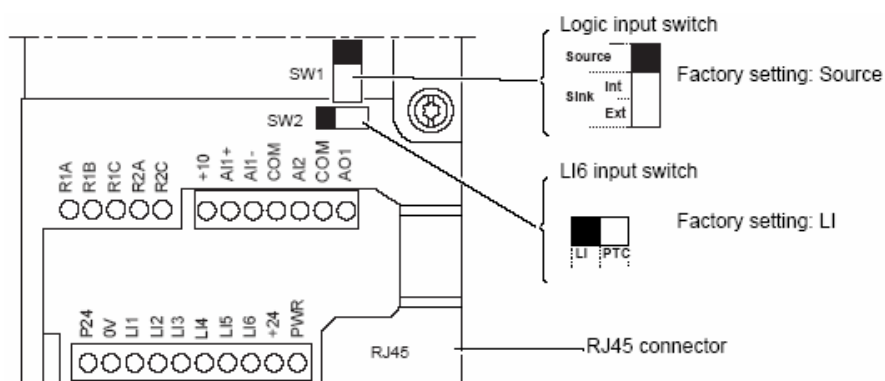
Note: The ATV71 is supplied with a link between the PWR and +24 terminals.

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
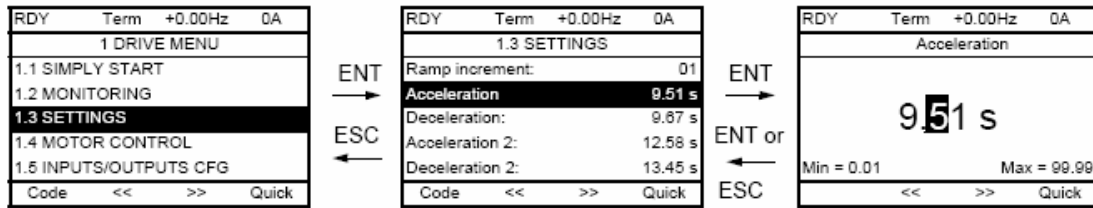
Note:

- 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. Elite to Altivar 71 parameter conversion

Navigation through the Elites group screen menus is managed through the Elites 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. Elite / Altivar 71 parameter comparison

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

Elite		Altivar 71	
Screen Group A - Auxiliary Screens	A1-Local Keyboard Mode Select	**[1.6 Command]**	
	A2-Local Torque Reference	**[1.2 Monitoring]**	HMI Torque ref. (LTR)
	A3-Local Speed Reference	**[1.2 Monitoring]**	HMI Frequency ref. (LFR)
	A4-Torque Reference, Speed Reference	**[6. Monitoring Config.]**	*Configurable* – Monitor Screen Type > Parameter Selection = Frequency ref., Torque reference
	A5-Motor Power, Motor RPM	**[6. Monitoring Config.]**	*Configurable* – Monitor Screen Type > Parameter Selection = Motor power, Motor speed
	A6-Motor Current, Stator Frequency	**[6. Monitoring Config.]**	*Configurable* – Monitor Screen Type > Parameter Selection = Motor current, Output frequency
	A6a-Phase Output Currents		*Cannot display individual phase currents*
	A7-Motor, Inverter Temperatures	**[6. Monitoring Config.]**	*Configurable* – Monitor Screen Type > Parameter Selection = Motor thermal state, Drv. thermal state
	A7a-Actual Heatsink & Internal Temps	**[6. Monitoring Config.]**	*Configurable* – Monitor Screen Type > Parameter Selection = Drv. thermal state
	A8-Bus and Output Voltages	**[6. Monitoring Config.]**	*Configurable* – Monitor Screen Type > Parameter Selection = Motor voltage
Screen Group C- Level Comparator	C1-Comparator Source Selection	**[1.5 Input/Outputs CFG]**	*The ATV71 does not have the equivalent function of the Elites Comparator. The same function can be achieved by using either the drives "threshold" assignments for R1 or R2 or by using the Ref. Operations i.e. summing, subtract, multiplier in the Application Function Menu.*
	C2-Comparator On Setpoint		
	C3-Comparator Off Setpoint		
	C4-Comparator Source Selection		
	C5-Comparator On Setpoint		
	C6-Comparator Off Setpoint		
Screen Group D– Dynamic Brake Controls	D1-Time Constant of Dynamic Brake Resistor	**[1.8 Fault Management]**	DB Res. Protection > *Time constant is calculated by the drive once the resistor power and ohmic value are entered.*

Elite		Altivar 71	
	D2-% Duty Rating of Dynamic Brake Resistor	**[1.8 Fault Management]**	DB Res. Protection > *Duty Rating is calculated by the drive once the resistor power and ohmic value are entered.*
Screen Group F – Fault History Screens	F-Fault Display Screen	**[1.10 Diagnostics]**	Fault History
	F1-Fault History Log	**[1.10 Diagnostics]**	Fault History > *Fault*
	F2-Fault History Log	**[1.10 Diagnostics]**	Fault History > *Fault*
	F3-Fault History Log	**[1.10 Diagnostics]**	Fault History > *Fault*
	F4-Fault History Log	**[1.10 Diagnostics]**	Fault History > *Fault*
	F5-Fault History Log	**[1.10 Diagnostics]**	Fault History > *Fault*
	F6-Clear Fault History Log		*You cannot clear the fault list*
Screen Group H – Serial Communications	H1-Select Serial Protocol to Use	**[1.9 Communication]**	Modbus Network or CANopen (*other comms options when additional comms cards are fitted.*)
	H2-Serial Communications Timeout	**[1.9 Communication]**	Modbus network (Md1) > Modbus time out (ttO)
Subgroup H3 – Modbus Communication Parameters	H3a-Modbus Serial Communications Address	**[1.9 Communication]**	Modbus network (Md1) > Modbus Address (Add)
	H3b-Modbus Serial Communications Baudrate	**[1.9 Communication]**	Modbus network (Md1) > Modbus baud rate (tbr)
	H3c-Modbus Parity Selection	**[1.9 Communication]**	Modbus network (Md1) > Modbus format (tFO)
Subgroup H4 – Devicenet Communication Parameters	H4a-Mac Identification Number	**[1.9 Communication]**	*Only visible when the DeviceNet Comms Card (VW3A3309) is fitted.*
	H4b-Devicenet Communication Baud Rate		
	H4c-Assembly Input Instance		
	H4d-Assembly Output Instance		
	H4e-Devicenet Control Source		
	H4f-Devicenet Reference Source		
	H4g-Devicenet Interface Status		
Screen Group I - Inputs	I1-Local Start/Stop and Reset Control	**[1.6 Command]**	Cmd Channel 1 (Cd1) > HMI
	I2-Speed Reference Source	**[1.6 Command]**	Ref.1 Channel (Fr1)
	I3-Torque Reference Source	**[1.7 Application Function]**	Torque Control > Torque Ref. Channel

Elite		Altivar 71	
	I4-Alternative Speed Reference Source	[1.6 Command]	Ref.2 Channel (Fr2)
	I5-Alternative Torque Reference Source		*No equivalent feature*
Subgroup I6 – Analogue Inputs	I6a-Analogue Input 1 Format	[1.5 Input/Outputs CFG]	*AI1 is not configurable and is fixed at 0 to 10V*
	I6b-Analogue Input 1 Low Setpoint	[1.5 Input/Outputs CFG]	AI1 Configuration (AI1) > AI1 Assignment (AI1) > AI1 min value (UIL1)
	I6c-Analogue Input 1 High Setpoint	[1.5 Input/Outputs CFG]	AI1 Configuration (AI1) > AI1 Assignment (AI1) > AI1 max value (UIH1)
	I6d-Analogue Input 2 Format	[1.5 Input/Outputs CFG]	AI2 Configuration (AI2) > AI2 Type (AI2t)
	I6e-Analogue Input 2 Low Setpoint	[1.5 Input/Outputs CFG]	AI2 Configuration (AI2) > AI2 Assignment (AI2) > AI2 min. value (CrL2) *or* (UIL2) *selection depends on mA / voltage assignment*
	I6f-Analogue Input 2 High Setpoint	[1.5 Input/Outputs CFG]	AI2 Configuration (AI2) > AI2 Assignment (AI2) > AI2 max. value (CrH2) *or* (UIH2) *selection depends on mA / voltage assignment*
	I6g-Zero Band of +/- 2 % for Analogue Input Sources	[1.5 Input/Outputs CFG]	Reference template (bP) > Deadband (bnS)
Subgroup I7 – Digital Inputs	I7a-Multi-Function Input Mode Selection	[1.1 Simply Start]	Macro configuration (CFG)
	I7b-Multi-Function Input Logical Inversion		*Input inversion via logic input sw.1 on control terminal card*
	I7c-Multi-Function 1 Input Selections (T13)	[1.3 Settings]	*Logic inputs are assignable through either macro-configuration or through menu specific assignment e.g. fault reset via menu 1.8 Fault Management.*
	I7d-Multi-Function 2 Input Selections (T14)		
	I7e-Multi-Function 3 Input Selections (T15)		
	I7f-Multi-Function 4 Input Selections (T16)		
	I7g-Multi-Function 5 Input Selections (T17)		
	I7h-Multi-Function 6 Input Selections (T18)		
Subgroup I8 – Fibre Optic Input	I8a-Fibre Input Low Setpoint		*The ATV71 does not support fibre media*
	I8b-Fibre Input High Setpoint		*The ATV71 does not support fibre media*
	I8c-Fibre Optic Control Mode Selection		*The ATV71 does not support fibre media*
	I8d-Fibre Optic Timeout Period		*The ATV71 does not support fibre media*
Screen Group L - Limits	L2-Minimum Speed	[1.3 Settings]	Low speed (LSP)

Elite		Altivar 71	
	L3-Maximum Speed	**[1.3 Settings]**	High speed (HSP)
	L4-Minimum Torque	**[1.7 Application Function]**	Torque Limitation (tOL) > Gen. torque lim (tLIG)
	L5-Maximum Torque	**[1.7 Application Function]**	Torque Limitation (tOL) > Motoring torque lim (tLIN)
	L6-Speed Limit Timeout		*No equivalent feature*
	L7-Torque Limit Timeout		Torque or I Lim. Detect. > Trq/I limit. time out
	L8-Regeneration Limit		*Equivalent function in the ATV71 uses DB Res. Protection parameters in the 1.8 Fault Management menu and Braking level in the 1.4 Motor Control menu.*
	L9-Current Limit	**[1.3 Settings]**	Current limitation (CLI)
	L10-Skip Speed 1		*No equivalent feature*
	L11-Skip Speed 2		*No equivalent feature*
	L12-Skip Bandwidth		*No equivalent feature*
	L13-Ground Current Limit		*No equivalent feature*
	L14-Run at Minimum Speed	**[1.3 Settings]**	Low speed time out (tLS)
Screen Group M– Multi-Reference Setpoints	M1-Multi-Reference Setpoint 1	**[1.7 Application Function]**	Preset speed 2 (SP2)
	M2-Multi-Reference Setpoint 2	**[1.7 Application Function]**	Preset speed 3 (SP3)
	M3-Multi-Reference Setpoint 3	**[1.7 Application Function]**	Preset speed 4 (SP4)
	M4-Multi-Reference Setpoint 4	**[1.7 Application Function]**	Preset speed 5 (SP5)
	M5-Multi-Reference Setpoint 5	**[1.7 Application Function]**	Preset speed 6 (SP6)
	M6-Multi-Reference Setpoint 6	**[1.7 Application Function]**	Preset speed 7 (SP7)
	M7-Multi-Reference Setpoint 7	**[1.7 Application Function]**	Preset speed 8 (SP8)
Screen Group N– Motor Nameplate Data	N1-Rated (Nameplate) Motor Current	**[1.1 Simply Start]**	Rated mot. current (NCr)
	N2-Rated (Nameplate) Motor Voltage	**[1.1 Simply Start]**	Rated motor volt. (UnS)
	N3-Rated (Nameplate) Motor Frequency	**[1.1 Simply Start]**	Rated motor freq. (FrS)
	N4-Rated (Nameplate) Motor Power	**[1.1 Simply Start]**	Rated motor power (nPr)
	N5-Rated (Nameplate) Motor Speed	**[1.1 Simply Start]**	Rated motor speed (nSP)
	N6-Motor Cooling at Zero Speed	**[1.8 Fault Management]**	Motor thermal prot.(tHt) > Motor protect. type (tHt)
	N8-Pulses per Revolution of Tacho Encoder	**[1.4 Motor Control]**	Number of pulses (PGI)
	N9-Selection of the type of Encoder	**[1.4 Motor Control]**	Encoder type (Ens)

Elite		Altivar 71	
Screen Group O–Outputs	O-Outputs	**[1.5 Input/Outputs CFG]**	
Subgroup O1 – Analogue Outputs	O1a-Analogue Output 1 Source Selection	**[1.5 Input/Outputs CFG]**	AO1 Configuration (AO1) > AO1 assignment (AO1)
	O1b-Analogue Output 1 Format	**[1.5 Input/Outputs CFG]**	AO1 Configuration (AO1) > AO1 Type (AO1t)
	O1c-Analogue Output 1 Low Setpoint	**[1.5 Input/Outputs CFG]**	AO1 Configuration (AO1) > AO1 min output (AOL1)
	O1d-Analogue Output 1 High Setpoint	**[1.5 Input/Outputs CFG]**	AO1 Configuration (AO1) > AO1 max output (AOH1)
	O1e-Analogue Output 2 Source Selection		*There is only one analogue output available.*
	O1f-Analogue Output 2 Format		*There is only one analogue output available.*
	O1g-Analogue Output 2 Low Setpoint		*There is only one analogue output available.*
	O1h-Analogue Output 2 High Setpoint		*There is only one analogue output available.*
Subgroup O2 – Digital Output Relays	O2a-Relay 1 Control Source Selection	**[1.5 Input/Outputs CFG]**	R1 Configuration (r1) > R1 Assignment (r1)
	O2b-Invert the Logic of Output Relay 1	**[1.5 Input/Outputs CFG]**	R1 Configuration (r1) > R1 Active at (r1S)
	O2c-Relay 2 Control Source Selection	**[1.5 Input/Outputs CFG]**	R2 Configuration (r2) > R2 Assignment (r2)
	O2d-Invert the Logic of Output Relay 2	**[1.5 Input/Outputs CFG]**	R2 Configuration (r2) > R2 Active at (r2S)
	O2e-Relay 3 Control Source Selection		*There are only 2 relay outputs available.*
	O2f-Invert the Logic of Output Relay 3		*There are only 2 relay outputs available.*
	O3a-Fibre Output Source Selection		*The ATV71 does not support fibre media*
Screen Group P – Process Control	P1-Process Control Setpoint	**[1.7 Application Function]**	PID Regulator > Act. Internal PID ref. (PII)
	P2-Process Control Feedback Source	**[1.7 Application Function]**	PID Regulator > PID feedback ass. (PIF)
	P3-Controller Gain	**[1.7 Application Function]**	PID Regulator > PID prop. gain (rPG)
	P4-Integration Time	**[1.7 Application Function]**	PID Regulator > PID integral gain (rIG)

Elite		Altivar 71	
	P5-Differentiation Time	**[1.7 Application Function]**	PID Regulator > PID derivative gain (rdG)
	P6-Process Error	**[1.2 Monitoring]**	PID error (rPE)
	P7-Invert PID	**[1.7 Application Function]**	PID Regulator > PID correct. reverse (PIC) = Yes
Screen Group R– Accel / Decel Rate	R1-Acceleration Rate	**[1.3 Settings]**	Acceleration (ACC)
	R2-Deceleration Rate	**[1.3 Settings]**	Deceleration (dEC)
	R3-Alternative Acceleration Rate	**[1.3 Settings]**	Acceleration 2 (AC2)
	R4-Alternative Deceleration Rate	**[1.3 Settings]**	Deceleration 2 (dE2)
	R5-Break Speed for Alternative Accel/Decel	**[1.7 Application Function]**	Ramp (rPt) > Ramp 2 threshold (Frt)
	R6-Deceleration (Stopping) Rate used when Stopping	**[1.7 Application Function]**	Stop configuration (Stt) > Type of stop (Stt) = Fast stop (FSt) *You must set up the Ramp divider (dCF) this is a coefficient that is used to divide the Dec ramp time.*
	R7-Speed S-Curve Filter Time Constant		*The S ramp curve coefficient is fixed with the ATV71 to change use a "Customized" ramp.*
	R8-Torque Filter Time Constant		*No equivalent feature*
Screen Group S – Start and Stop Modes	S1-Usual Starting Mode	**[1.8 Fault Management]**	Catch on the fly (FLr) > Catch on the fly (FLr) = Yes
	S2-Usual Stopping Mode	**[1.7 Application Function]**	Stop Configuration (Stt)
	S4-Alternative Stopping Mode		*No equivalent feature*
	S5-Start Delay Time	**[1.5 Input/Outputs CFG]**	Lix Configuration (LI-) > Lix On Delay (Lid)
	S6-Off Delay Time		*No equivalent feature*
	S7-Mains Power Loss Response	**[1.8 Fault Management]**	Catch on the fly (FLr) > Catch on the fly (FLr)
	S8-DC Brake Current Level	**[1.7 Application Function]**	Auto DC Injection (AdC) > Auto DC inj. Level 1 (SdC1)
	S9-DC Hold Voltage		*No equivalent feature*
	S10-DC Heat Current		*No equivalent feature*
	S11-Stop Timeout		*No equivalent feature*
	S12-Brake Release Time	**[1.7 Application Function]**	Brake Logic Control (bLC) > Brake release time (brt)

Elite		Altivar 71	
	S13-Pre Torque	**[1.7 Application Function]**	*Can be achieved either through current or frequency release thresholds in the*
Screen Group X – Tuning	X1-Selection of Operating Mode	**[1.4 Motor Control]**	Motor control type (Ctt)
	X2-Autotunes Motor	**[1.4 Motor Control]**	Auto-tuning (tUn)
Subgroup X3 – Motor Tuning	X3a-Main Inductance	**[1.4 Motor Control]**	Idw (IdA) *Magnetizing current in A.*
	X3b-Stator Resistance	**[1.4 Motor Control]**	R1w (rSA) *Cold state stator resistance.*
	X3c-Rotor Resistance		*No equivalent feature*
	X3d-Total Leakage	**[1.4 Motor Control]**	Lfw (LFA) *Leakage inductance in mH.*
	X3e-Field Weakening Point		*No equivalent feature*
Subgroup X4 – Load Tuning	X4a-Dynaflux Minimum Flux Level		*No equivalent feature*
	X4b-Starting Boost Type		*No equivalent feature*
	X4c-Starting Torque (Boost) Adjustment		*No equivalent feature*
	X4d-Starting (Boost) Band Adjustment		*No equivalent feature*
	X4f-Rotor Speed PID Loop Proportional Gain		*No equivalent feature*
	X4g-Rotor Speed PID Loop Integral Gain		*No equivalent feature*
	X4h-Rotor Speed PID Loop Derivative Gain		*No equivalent feature*
	X4i-Flux Boost A		*No equivalent feature*
	X4j-Flux Boost B		*No equivalent feature*
	X4k-Inertia Compensation		*No equivalent feature*
Subgroup X5 – Controller Tuning	X5a-Current Limit Slip Value		*No equivalent feature*
	X5b-Voltage Limit Slip		*No equivalent feature*
	X5c-No Load Damping		*No equivalent feature*
	X5d-Enable Slip Compensation	**[1.4 Motor Control]**	Slip compensation (SLP)
	X5e-Modulation Frequency	**[1.4 Motor Control]**	Switching freq.
	X5f-Modualtion Type		*No equivalent feature*
	X5g-Current PI Loop Proportional Gan		*No equivalent feature*
	X5h-Current PI Loop Integral Gain		*No equivalent feature*
	X5i-Rotor Speed Filter Constant		*No equivalent feature*
Screen Group Y – Menu Options	Y1-Selects Language of Screen List	**[5. Language]**	*Choose language*

Elite		Altivar 71	
Screen Group Z – Commissioning Screens	Y2-Selects Level of Initialisation of Parameters and Modes	**[1.12 Factory Settings]**	Parameter Group List (FrY) *To select the parameters you wish to return to defaults.* Go to factory settings (GFS) *To return the selected parameters to default settings.*
	Y3-Control Program Selection	**[1.7 Application Function]**	Param. set switching (nLP)
	Z-Commissioning Mode		*Dependent on Access Level and whether or not the configuration has been passworded.*
	Z1-Commissioning Mode Password	**[4. Password]**	Status (CSt) *The drive can be locked by a password*
	Z2-Software and Hardware Revision Numbers	**[1.11 Identification]**	*Identifies the drive type, optional hardware and software versions*
	Z2a-Control Board Serial Number	**[1.11 Identification]**	*Identifies the drive type, optional hardware and software versions*
Subgroup X4 – Load Tuning	Z3-Status of Analogue Input 1	**[1.2 Monitoring]**	I/O Map (IOM) > Analog inputs image (AIA)
	Z4-Status of Analogue Input 2	**[1.2 Monitoring]**	I/O Map (IOM) > Analog inputs image (AIA)
	Z5-Status of Analogue Output 1	**[1.2 Monitoring]**	I/O Map (IOM) > Analog outputs image (AOA)
	Z6-Status of Analogue Output 2		*There is only one analogue output available.*
	Z7-Status of Multi-Function Inputs	**[1.2 Monitoring]**	I/O Map (IOM) > Logic input map (LIA)
	Z8-Status of Fibre Optic Input; Status of Serial Input		*The ATV71 does not support fibre media*
	Z9-Encoder Count		*No equivalent feature*
	Z9a-Encoder Speed		*No equivalent feature*
	Z10-Status of Output Relays; Status of Dynamic Brake Output	**[1.2 Monitoring]**	I/O Map (IOM) > Logic output map (LOA)
	Z11-Fibre Optic Input Status		*The ATV71 does not support fibre media*
	Z12-Fibre Optic Output Status		*The ATV71 does not support fibre media*

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

- **<u>BASIC</u> –** 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.
- **<u>STANDARD</u> –** 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.
- **<u>ADVANCED</u> –** Access to all menus and submenus. Several functions can be assigned to each input.
- **<u>EXPERT</u> –** 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 Elite to Altivar parameter conversions:

The following examples are typical applications that highlight the differences between the Elite 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: Elite 3 wire control for simple fan speed control

A typical application example is for simple fan speed control using a potentiometer to set 0-10V speed reference, and pushbuttons for start and remote stop control. External speed monitoring is achieved using a simple 0-10V meter representing 0-100% speed.

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

Elite		Altivar 71	
Subgroup I7 – Digital Inputs	I7a-Multifunction Input Mode I7a I/P MODE = 01	[1.1 Simply Start]	2/3 wire control (tCC) = 3 wire (3C)
	No Equivalent		Macro configuration (CFG) = Start/Stop (StS)
Screen Group N– Motor Nameplate Data	N4-Rated (Nameplate) Motor Power N4 MTR P = Nameplate		Rated motor power (nPr) = Nameplate
	N2-Rated (Nameplate) Motor Voltage N2 MTR VOLT = Nameplate		Rated motor volt. (UnS) = Nameplate
	N1-Rated (Nameplate) Motor Current N1 MTR CUR = Nameplate		Rated mot. current (nCr) = Nameplate
	N3-Rated (Nameplate) Motor Frequency N3 MTR FR = Nameplate		Rated motor freq. (FrS) = Nameplate
	N5-Rated (Nameplate) Motor Speed N5 MTR RPM = Nameplate		Rated motor speed (nSP) = Nameplate
	No Equivalent		Mot. therm. Current (ItH) = Nameplate (rated motor current)
Screen Group R– Accel / Decel Rates	R1-Acceleration Rate R1 ACC		Acceleration (ACC)
	R2-Deceleration Rate R2 DEC		Deceleration (dEC)
Screen Group L - Limits	L2-Minimum Speed L2 MIN S = 0%		Low speed (LSP) = 0Hz
	L3-Maximum Speed ds L3 MAX S = +100%		High speed (HSP) = 50Hz
Screen Group I - Inputs	I1-Local Start/Stop and Reset Control I1 LOCAL S/STOP = 0	[1.6 Command]	Stop Key priority (PSt) = No
	I2-Speed Reference Source I2 REF S = AIN1		Ref.1 Channel (Fr1) = AI1

Elite		Altivar 71	
Subgroup I6 – Analogue Inputs	I6a-Analogue Input 1 Format I6a AI1 = 0-10V		*AI1 is not configurable and is fixed at 0 to 10V*
	I6b-Analogue Input 1 Low Setpoint I6b AI1 LO = 0%	**[1.5 Input/Outputs CFG]**	AI1 Configuration (AI1) > AI1 Assignment (AI1) > AI1 min value (UIL1) = 0V
	I6c-Analogue Input 1 High Setpoint I6c AI1 HI = +100%		AI1 Configuration (AI1) > AI1 Assignment (AI1) > AI1 max value (UIH1) = 10.0V
Subgroup O1 – Analogue Outputs	O1a-Analogue Output 1 Source Selection O1a AO1 O/P = 06		AO1 Configuration (AO1) > AO1 assignment (AO1) = Motor freq. (Ofr)
	O1b-Analogue Output 1 Format O1b AO1 = 0-10V		AO1 Configuration (AO1) > AO1 Type (AO1t) = Voltage (10U)
	O1c-Analogue Output 1 Low Setpoint O1c AO1 LO = 0%		AO1 Configuration (AO1) > AO1 min output (AOL1) = 0V
	O1d-Analogue Output 1 High Setpoint O1d AO1 HI = 100%		AO1 Configuration (AO1) > AO1 max output (AOH1) = 10V
Screen Group L - Limits	L9-Current Limit L9 I LIMIT = 150% of FLC	**[1.3 Settings]**	Current limitation (CLI) = 150% of FLC
		[1.1 Simply Start]	Max frequency (tFr) *Set Max frequency to the same setting as HSP as AO1's format "Motor freq." is scaled between 0 and Max frequency.*

Note: In 3 wire control the Altivar 71 uses logic input 1 (LI1) as the stop command using a normally closed circuit. Logic input 2 (LI2) is the forward command and logic input 3 is the reverse command. The reverse command can be inhibited via the **[1.6 Command]** menu.

18.1.1 Elite 3 wire control for simple fan speed control

Elite Inputs	Function	Altivar 71 Inputs	Function
MFI 1	ASTOP-RESET	**LI1**	STOP
MFI 2	START	**LI2**	FORWARD
MFI 3	STOP-RESET	**LI4**	A/STOP
MFI 4	INVERT DIRECTION	**LI3**	REVERSE
MFI 5	INVERT TORQUE	**LI5**	Not assigned
MFI 6	SPEED / TORQUE	**LI6**	Not assigned
Analogue Input 1	Speed Ref. 0-10V	**Analogue Input 1**	Speed Ref. 0-10V

Note: The default speed reference for the Elite is "local" and the default speed reference for the Altivar 71 is "analogue input 1". The "invert direction" command on the Elite 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: Elite multi-reference 3 wire control

Another application example used typically in material handling systems or machines that have several operating speeds. This example uses 3 wire control and speed selection via logic inputs the Altivar 71 is capable of providing up to 16 preset speeds where as the Elite has a maximum of 7.

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

Elite		Altivar 71	
Subgroup I7 – Digital Inputs	I7a-Multi-Function Input Mode Selection I7a I/P MODE = 04	**[1.1 Simply Start]**	2/3 wire control (tCC) = 3 wire (3C)
	No Equivalent		Macro configuration (CFG) = M. handling (HdG)
	I7c-Multi-Function 1 Input Selections (T13) I7c MFI 1 SEL = 02		*Already configured by selection of 3 wire control.*
	I7d-Multi-Function 2 Input Selections (T14) I7d MFI 2 SEL = 01		*Already configured by selection of 3 wire control.*
	I7e-Multi-Function 3 Input Selections (T15) I7e MFI 3 SEL = 10		*Already configured by selection of 3 wire control.*
Screen Group I - Inputs	I1-Local Start/Stop and Reset Control I1 LOCAL S/STOP = 02	**[1.6 Command]**	Stop Key priority (PSt) = YES
	I2-Speed Reference Source I2 REF = MREF		No Equivalent
Screen Group N– Motor Nameplate Data	N4-Rated (Nameplate) Motor Power N4 MTR P = Nameplate	**[1.1 Simply Start]**	Rated motor power (nPr) = Nameplate
	N2-Rated (Nameplate) Motor Voltage N2 MTR VOLT = Nameplate		Rated motor volt. (UnS) = Nameplate
	N1-Rated (Nameplate) Motor Current N1 MTR CUR = Nameplate		Rated mot. current (nCr) = Nameplate
	N3-Rated (Nameplate) Motor Frequency N3 MTR FR = Nameplate		Rated motor freq. (FrS) = Nameplate
	N5-Rated (Nameplate) Motor Speed N5 MTR RPM = Nameplate		Rated motor speed (nSP) = Nameplate
	No Equivalent		Mot. therm. Current (ItH) = Nameplate (rated motor current)
Screen Group R– Accel / Decel	R1-Acceleration Rate R1 ACC		Acceleration (ACC)
	R2-Deceleration Rate R2 DEC		Deceleration (dEC)
Screen Group L - Limits	L2-Minimum Speed L2 MIN S = 0%		Low speed (LSP) = 0Hz

Elite		Altivar 71	
Screen Group L - Limits	L3-Maximum Speed ds L3 MAX S = +100%		High speed (HSP) = 50Hz
	L9-Current Limit L9 I LIMIT = 150% of FLC	**[1.3 Settings]**	Current limitation (CLI) = 150% of FLC
Screen Group M– Multi-Reference Setpoints	M1-Multi-Reference Setpoint 1 M1 MREF1 = *speed* Hz	**[1.7 Application Function]**	*Preset speed 1 is the Reference (1) speed Default = AI1*
	M2-Multi-Reference Setpoint 2 M2 MREF2 = *speed* Hz		Preset speeds (PSS) > Preset speed 2 (SP2) = *required speed in* Hz
	M3-Multi-Reference Setpoint 3 M3 MREF3 = *speed* Hz		Preset speeds (PSS) > Preset speed 3 (SP3) = *required speed in* Hz
	M4-Multi-Reference Setpoint 4 M4 MREF4 = *speed* Hz		Preset speeds (PSS) > Preset speed 4 (SP4) = *required speed in* Hz
	M5-Multi-Reference Setpoint 5 M5 MREF5 = *speed* Hz		Preset speeds (PSS) > Preset speed 5 (SP5) = *required speed in* Hz
	M6-Multi-Reference Setpoint 6 M6 MREF6 = *speed* Hz		Preset speeds (PSS) > Preset speed 6 (SP6) = *required speed in* Hz
	M7-Multi-Reference Setpoint 7 M7 MREF7 = *speed* Hz		Preset speeds (PSS) > Preset speed 7 (SP7) = *required speed in* Hz
	No Equivalent		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 Elite / Altivar 71 I/O comparison for multi-reference 3 wire control

Elite Inputs	Function	Altivar 71 Inputs	Function
MFI 1	STOP	**LI1**	STOP
MFI 2	START	**LI2**	FORWARD
MFI 3	INVERT SPEED	**LI3**	REVERSE
MFI 4	MULTI-SPEED REF.	**LI4**	2 PRESET SPEEDS
MFI 5	MULTI-SPEED REF.	**LI5**	4 PRESET SPEEDS
MFI 6	MULTI-SPEED REF.	**LI6**	8 PRESET SPEEDS

18.2.2 Elite / Altivar speed selection logic tables comparison

SCREEN	TITLE	MULTI-REFERENCE FUNCTIONS		
		MFI4 (T16) X	MFI5 (T17) Y	MFI6 (T18) Z
	ZERO	O	O	O
M1	MREF1	O	O	X
M2	MREF2	O	X	O
M3	MREF3	O	X	X
M4	MREF4	X	O	O
M5	MREF5	X	O	X
M6	MREF6	X	X	O
M7	MREF7	X	X	X

O= Open X = Closed

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

Elite multi-speed logic chart   **Altivar 71 multi-speed logic chart**

Please note that speed preset input logic state 0, 0, 0 for the Elite 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 Channel (Default = AI1).

19. Elite / 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.

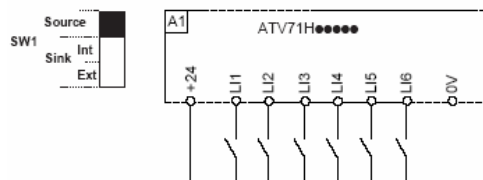| Elite parameter	Typical unit	Altivar 71 parameter	Typical unit
AI*X* - Scaling	-150/+150 Hz	AI*X* – Scaling	0/20mA or 1/10VDC
Acceleration	5.0Hz/sec	Acceleration	3.0sec (0 – 50Hz)
Deceleration	5.0Hz/sec	Deceleration	3.0sec (0 – 50Hz)
Alt. Accel. Rate	10Hz/sec	Acceleration 2	5.0sec (0 – 50Hz)
Alt. Decel. 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 ⎓
R2A R2C	N/O contact of programmable relay R2	• 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

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

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

+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

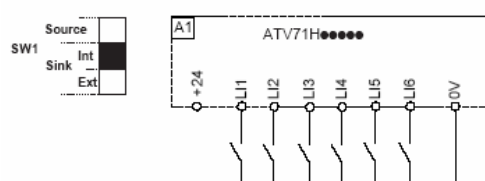## 20.2 Altivar 71 logic switching examples

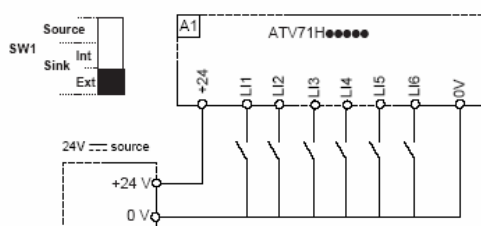- SW1 switch set to "Source" position

- SW1 switch set to "Source" position and use of an external power supply for the LIs
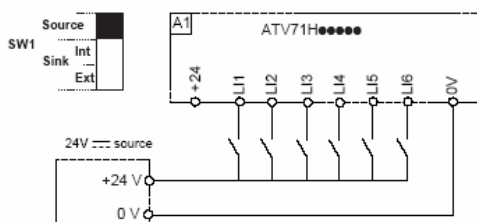
- SW1 switch set to "Int Sink" position

- SW1 switch set to "Ext Sink" position

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)
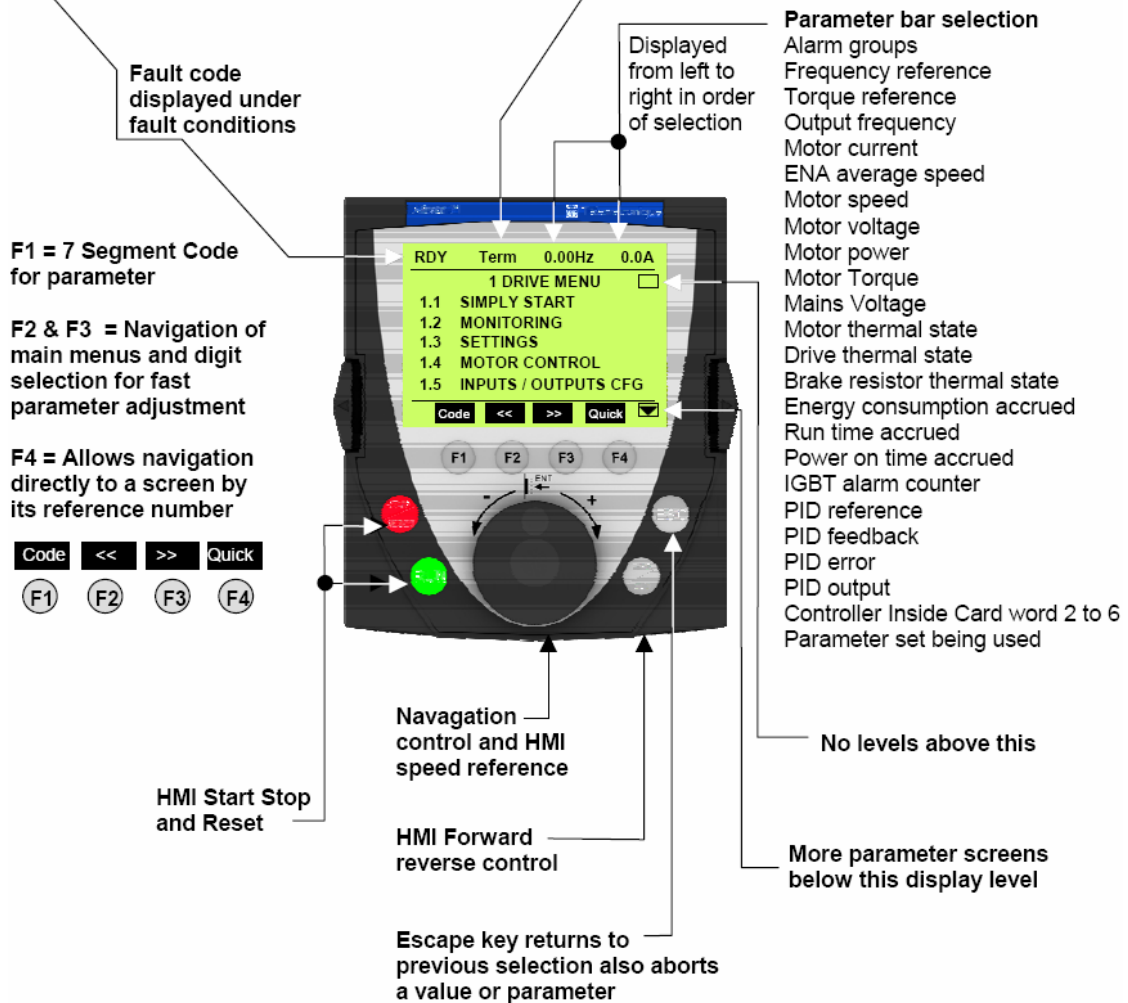- Analogue output AO1: 0-20mA, motor frequency

20.4 Graphic display terminal overview

Drive state
ACC: Acceleration (Output frequency increasing)
CLI: Drive current limiting
CTL: Controlled stop on input phase loss
DCB: DC injection braking in progress
DEC: Deceleration (Output frequency decreasing)
FLU: Motor fluxing in progress
FST: Fast stop
NLP: No line power
NST: Freewheel stop
OBR: Auto adapted deceleration
PRA: Drive locked, (Power removal function active)
RDY: Drive ready
RUN: Drive running
SOC: Controlled output cut in progress
TUN: Auto tuning in progress
USA: Under voltage alarm

Active control channel
Term: Terminals
HMI: Graphic display terminal
MDB: Integrated Modbus
CAN: Integrated CANopen
NET: Communication card
APP: Controller Inside card

Fault code displayed under fault conditions

Displayed from left to right in order of selection

Parameter bar selection
Alarm groups
Frequency reference
Torque reference
Output frequency
Motor current
ENA average speed
Motor speed
Motor voltage
Motor power
Motor Torque
Mains Voltage
Motor thermal state
Drive thermal state
Brake resistor thermal state
Energy consumption accrued
Run time accrued
Power on time accrued
IGBT alarm counter
PID reference
PID feedback
PID error
PID output
Controller Inside Card word 2 to 6
Parameter set being used

F1 = 7 Segment Code for parameter

F2 & F3 = Navigation of main menus and digit selection for fast parameter adjustment

F4 = Allows navigation directly to a screen by its reference number

| Code | << | >> | Quick |
| F1 | F2 | F3 | F4 |

| RDY | Term | 0.00Hz | 0.0A |
| 1 DRIVE MENU |
1.1	SIMPLY START
1.2	MONITORING
1.3	SETTINGS
1.4	MOTOR CONTROL
1.5	INPUTS / OUTPUTS CFG
Code	<<	>>	Quick

F1 F2 F3 F4

Navagation control and HMI speed reference

HMI Start Stop and Reset

HMI Forward reverse control

Escape key returns to previous selection also aborts a value or parameter

No levels above this

More parameter screens below this display level

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