

SECTION 4: MAINTENANCE AND TROUBLESHOOTING

PRECAUTIONS

Read the following safety statements before proceeding with any maintenance or troubleshooting procedures.

⚠ DANGER

HAZARDOUS VOLTAGE

- Disconnect all power before servicing the drive controller.
- Read and understand these procedure and the precaution on page 16 of this manual before servicing the ATV31 drive controllers.
- Installation, adjustment, and maintenance of these drive controllers must be performed by qualified personnel.

Failure to follow this instruction will result in death or serious injury.

ROUTINE MAINTENANCE

Perform the following steps at regular intervals:

- Check the condition and tightness of the connections.
- Make sure that the ventilation is effective and that the temperature around the drive controller remains at an acceptable level.
- Remove dust and debris from the drive controller, if necessary.

NORMAL DISPLAY

A normal display with no fault present and no run command shows:

- The value of one of the display parameters (see page 84).
- Init: Initialization sequence
- rdY: Drive ready
- dcb: DC injection braking in progress
- nSt: Freewheel stop. See page 17.
- FSt: Fast stop
- tUn: Auto-tuning in progress

FAULT DISPLAY

If a problem arises during setup or operation, ensure that all ambient environment, mounting, and connection recommendations have been followed.

The first fault detected is stored and displayed, flashing, on the screen. The drive controller locks and the fault relay (RA-RC) contact opens, if it has been configured for this function.

Drive Controller Does Not Start, No Fault Displayed

If the drive controller will not start and there is no display indication, consider the following:

1. Check the power supply to the drive controller.
2. The assignment of the fast stop or freewheel stop functions prevents the drive controller from starting if the corresponding logic inputs are not powered up. In this case, the drive controller displays nSt in freewheel stop mode and FSt in fast mode. This is normal, since these functions are active at zero speed so that the drive controller will stop safely if there is a wire break.
3. Ensure that the run command inputs have been actuated in accordance with the chosen control mode (tCC parameter in the I-O- menu. See page 33).

4. If an input is assigned to the limit switch function and this input is at state 0, the drive controller can only be started by sending a command for the opposite direction (see page 76).
5. If the reference channel (page 41) or the control channel (page 42) is assigned to Modbus or CANopen, the drive controller displays nSt on power up and remains stopped until the communication bus sends a command.

Clearing Faults

The drive controller can be unlocked after a fault by the following methods:

- Removing power from the drive controller until the display clears.
- Automatically, if the automatic restart function is enabled (parameter Atr is set to Yes, see page 79)
- By a logic input, if a logic input is assigned to the fault reset function (parameter rSF assigned to LI[•], see page 79)

Faults Which Cannot Be Automatically Reset

Faults which cannot be automatically reset are listed in the table below. To clear these faults:

1. Remove power from the drive controller.
2. Wait for the display to go off completely.
3. Determine the cause of the fault and correct it.
4. Reapply power.

bLF, CrF, OCF, SOF, and tnF can also be reset remotely via a logic input. Refer to the rSF parameter on page 79.

Fault	Probable Cause	Remedy
<i>b L F</i> Brake sequence	Brake release current not reached	<ul style="list-style-type: none"> • Check the drive controller and motor connections. • Check the motor windings. • Check the lbr setting in the FUN-menu. Refer to page 72.
<i>C r F</i> Precharge circuit fault	Precharge circuit damaged	<ul style="list-style-type: none"> • Reset the drive controller. • Replace the drive controller.
<i>I n F</i> Internal fault	<ul style="list-style-type: none"> • Internal fault • Internal connection fault 	<ul style="list-style-type: none"> • Remove sources of electromagnetic interference. • Replace the drive controller.
<i>O C F</i> Overcurrent	<ul style="list-style-type: none"> • Incorrect parameter settings in the SEt- and drC- menus • Acceleration too rapid • Drive controller and/or motor undersized for load • Mechanical blockage 	<ul style="list-style-type: none"> • Check the SEt- and drC- parameters. • Ensure that the size of the motor and drive controller is sufficient for the load. • Clear the mechanical blockage.
<i>S C F</i> Motor short circuit	<ul style="list-style-type: none"> • Short circuit or grounding at the drive controller output • Significant ground leakage current at the drive controller output if several motors are connected in parallel 	<ul style="list-style-type: none"> • Check the cables connecting the drive controller to the motor, and check the motor insulation. • Reduce the switching frequency. • Connect output filters in series with the motor.
<i>S O F</i> Overspeed	<ul style="list-style-type: none"> • Instability • Overhauling load 	<ul style="list-style-type: none"> • Check the motor, gain, and stability parameters. • Add a braking resistor. • Check the size of the motor, drive controller, and load.
<i>t n F</i> Auto-tuning fault	<ul style="list-style-type: none"> • Motor or motor power not suitable for the drive controller • Motor not connected to the drive controller 	<ul style="list-style-type: none"> • Use the L or the P ratio (see UfT on page 31). • Check the presence of the motor during auto-tuning. • If a downstream contactor is being used, close it during auto-tuning.

Faults Which Can Be Automatically Reset

After the cause of the fault has been removed, the faults in the table below can be reset:

- With the automatic restart function. Refer to the Atr parameter in the FLt-menu on page 79.
- Via a logic input. Refer to the rSF parameter in the FLt- menu on page 79.
- By cycling power to the drive controller.

Fault	Probable Cause	Remedy
CDF Serial link failure CANopen	Loss of communication between the drive controller and communication device or remote keypad.	<ul style="list-style-type: none"> • Check the communication bus. • Refer to the product-specific documentation.
EPF External fault	User defined	User defined
LF F Loss of 4-20 mA follower	Loss of the 4-20 mA reference on input AI3	Check the connection on input AI3.
ObF Overvoltage during deceleration	<ul style="list-style-type: none"> • Braking too rapidly • Overhauling load 	<ul style="list-style-type: none"> • Increase the deceleration time. • Install a braking resistor if necessary. • Activate the brA function if it is compatible with the application. Refer to page 52.
OHF Drive overload	<ul style="list-style-type: none"> • Drive controller or ambient temperature are too high. • Continuous motor current load is too high. 	Check the motor load, the drive controller ventilation, and the environment. Wait for the drive controller to cool before restarting.
OL F Motor overload	<ul style="list-style-type: none"> • Thermal trip due to prolonged motor overload • Motor power rating too low for the application 	Check the Ith setting (motor thermal protection, page 26), check the motor load. Allow the motor to cool before restarting.
OPF Motor phase failure	<ul style="list-style-type: none"> • Loss of phase at drive controller output • Downstream contactor open • Motor not connected • Instability in the motor current • Drive controller oversized for motor 	<ul style="list-style-type: none"> • Check the connections from the drive controller to the motor. • If a downstream contactor is being used, set OPL to OAC. Refer to page 80. • Test the drive controller on a low power motor or without a motor: set OPL to nO. Refer to page 80. • Check and optimize the UFr (page 27), UnS (page 30), and nCr (page 30) parameters and perform auto-tuning (page 31).
OSF Overvoltage during steady state operation or during acceleration	<ul style="list-style-type: none"> • Line voltage too high • Line supply transients 	<ul style="list-style-type: none"> • Check the line voltage. Compare with the drive controller nameplate rating. • Reset the drive controller.
PHF Input phase failure	<ul style="list-style-type: none"> • Input phase loss, blown fuse • Three-phase drive controller used on a single phase line supply • Input phase imbalance • Transient phase fault <p><i>NOTE: This protection only operates with the drive controller running under load.</i></p>	<ul style="list-style-type: none"> • Check the connections and the fuses. • Disable the fault by setting IPL to nO. Refer to page 80. • Verify that the input power is correct. • Supply three-phase power if needed.
SLF Serial link failure Modbus	Loss of connection between the drive controller and the communication device or the remote keypad display.	<ul style="list-style-type: none"> • Check the communication connection. • Refer to the product-specific documentation.

Faults That Reset When the Fault Is Cleared

Fault	Probable Cause	Remedy
<i>CF F</i> Configuration fault	The parameter configurations are not suited to the application.	Restore the factory settings or load the backup configuration, if it is valid. See parameter FCS in the drC- menu, page 35.
<i>CF I</i> Configuration fault via serial link	The parameter configurations loaded in the drive controller via the serial link are not suited to the application.	<ul style="list-style-type: none"> • Check the configuration loaded previously. • Load a compatible configuration.
<i>U S F</i> Undervoltage	<ul style="list-style-type: none"> • Line supply too low • Transient voltage dip • Damaged precharge resistor 	<ul style="list-style-type: none"> • Check the line voltage. • Check the setting of the UNS parameter. See page 30. • Replace the drive controller.

CONFIGURATION SETTINGS TABLES

Use the configuration settings tables beginning on page 91 to prepare and record the configuration before programming the drive controller. It is always possible to **return to the factory settings** by setting the FCS parameter to Init in the drC-, I-O-, CtL-, or FUn- menus. See pages 32, 35, 49, or 77.

Drive Controller and Customer ID

Drive Controller ATV31.....
Customer ID no. (if applicable).....

1st level Adjustment Parameter

bFr

Code	Factory Setting	Custom Setting
<u>bFr</u>	50	

Settings Menu 

Code	Factory Setting	Custom Setting
<u>ACC</u>	3 s	s
<u>ACC2</u>	5 s	s
<u>DEC2</u>	5 s	s
<u>DEC</u>	3 s	s
<u>EA1</u>	10%	%
<u>EA2</u>	10%	%
<u>EA3</u>	10%	%
<u>EA4</u>	10%	%
<u>LSP</u>	0 Hz	Hz
<u>HSP</u>	bFr	Hz
<u>IEH</u>	According to drive rating	A
<u>UFr</u>	20%	%
<u>FLG</u>	20%	%
<u>StA</u>	20%	%
<u>SLP</u>	100 Hz	%
<u>IdC</u>	0.7 In (1)	A
<u>EdC</u>	0.5 s	s
<u>EdC1</u>	0.5 s	s
<u>SdC1</u>	0.7 In (1)	A
<u>EdC2</u>	0 s	s
<u>SdC2</u>	0.5 In (1)	A
<u>JPF</u>	0 Hz	Hz
<u>JF2</u>	0 Hz	Hz
<u>JGF</u>	10 Hz	Hz
<u>rPG</u>	1	
<u>rIG</u>	1 / s	/s
<u>FbS</u>	1	
<u>PIC</u>	nO	

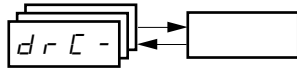
Code	Factory Setting	Custom Setting
<u>rP2</u>	30%	%
<u>rP3</u>	60%	%
<u>rP4</u>	90%	%
<u>SP2</u>	10 Hz	Hz
<u>SP3</u>	15 Hz	Hz
<u>SP4</u>	20 Hz	Hz
<u>SP5</u>	25 Hz	Hz
<u>SP6</u>	30 Hz	Hz
<u>SP7</u>	35 Hz	Hz
<u>SP8</u>	40 Hz	Hz
<u>SP9</u>	45 Hz	Hz
<u>SP10</u>	50 Hz	Hz
<u>SP11</u>	55 HZ	Hz
<u>SP12</u>	60 Hz	Hz
<u>SP13</u>	70 Hz	Hz
<u>SP14</u>	80 Hz	Hz
<u>SP15</u>	90 Hz	Hz
<u>SP16</u>	100 Hz	Hz
<u>CL1</u>	1.5 In ¹	A
<u>CL2</u>	1.5 In ¹	A
<u>EL5</u>	0 (no time limit)	s
<u>rSL</u>	0	
<u>UFr2</u>	20%	%
<u>FLG2</u>	20%	%
<u>StA2</u>	20%	%
<u>SLP2</u>	100%	%
<u>FEd</u>	bFr	Hz
<u>Ed</u>	100%	%
<u>Ed</u>	In ¹	A
<u>Sd5</u>	30	
<u>SFr</u>	4 kHz	kHz

¹ In corresponds to the nominal drive current indicated in the *ATV31 Installation Manual* and on the drive controller nameplate.



These parameters only appear if the corresponding function is enabled.
The majority can also be accessed and adjusted in the function configuration menu.
Those which are underlined appear in factory settings mode.

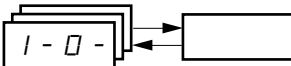
Drive Control Menu



Code	Factory Setting	Custom Setting
<i>b F r</i>	50 Hz	Hz
<i>U n S</i>	Varies with drive rating	V
<i>F r S</i>	50 Hz	Hz
<i>n C r</i>	Varies with drive rating	A
<i>n S P</i>	Varies with drive rating	RPM
<i>C D S</i>	Varies with drive rating	
<i>r S C</i>	nO	

Code	Factory Setting	Custom Setting
<i>t U S</i>	tAb	
<i>U F t</i>	n	
<i>n r d</i>	YES	
<i>S F r</i>	4 kHz	kHz
<i>t F r</i>	60 Hz	Hz
<i>S r F</i>	nO	

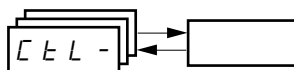
I/O Menu



Code	Factory Setting	Custom Setting
<i>t C C</i>	2C ATV31.....A: LOC	
<i>t C t</i>	trn	
<i>r r S</i>	if tCC = 2C, LI2 if tCC = 3C, LI3 if tCC = LOC: nO	
<i>C r L 3</i>	4 mA	mA
<i>C r H 3</i>	20 mA	mA

Code	Factory Setting	Custom Setting
<i>R D I t</i>	0A	
<i>d D</i>	nO	
<i>r 1</i>	FLt	
<i>r 2</i>	nO	

Control Menu



Code	Factory Setting	Custom Setting
<i>L R C</i>	L1	
<i>F r 1</i>	AI1 AIP for ATV31.....A	
<i>F r 2</i>	nO	
<i>r F C</i>	Fr1	
<i>C H C F</i>	SIM	
<i>C d 1</i>	tEr LOC for ATV31.....A	

Code	Factory Setting	Custom Setting
<i>C d 2</i>	Mdb	
<i>C C S</i>	Cd1	
<i>C D P</i>	nO	
<i>L C C</i>	nO	
<i>P S t</i>	YES	
<i>r D t</i>	dFr	

These parameters only appear if the corresponding function is enabled.

Application Functions Menu



Code		Factory Setting	Custom Setting
r P C -	r P t	LIn	
	t R 1	10%	%
	t R 2	10%	%
	t R 3	10%	%
	t R 4	10%	%
	R C C	3 s	s
	d E C	3 s	s
	r P 5	nO	
	F r t	0	Hz
	R C 2	5 s	s
	d E 2	5 s	s
	b r R	YES	
S E C -	S t t	Stn	
	F S t	nO	
	d C F	4	
	d C 1	nO	
	I d C	0.7 In	A
	t d C	0.5 s	s
	n S t	nO	
R d C -	R d C	YES	
	t d C 1	0.5 s	s
	S d C 1	0.7 In ¹	A
	t d C 2	0 s	s
	S d C 2	0.5 In ¹	A
S A 1 -	S A 2	AI2	
	S A 3	nO	

Code		Factory Setting	Custom Setting
J O G -	J O G	If tCC = 2C: nO If tCC = 3C: LI4 If tCC = LOC: nO	
	J G F	10 Hz	Hz
U P d -	U S P	nO	
	d S P	nO	
P I -	S t r	nO	
	P I F	nO	
	r P G	1	
	r I G	1	
	F b 5	1	
	P I C	nO	
	P r 2	nO	
	P r 4	nO	
	r P 2	30%	%
	r P 3	60%	%
	r P 4	90%	%
	r 5 L	0	
	P I 1	nO	
r P 1	0%	%	
b L C -	b L C	nO	
	b r L	Varies with drive controller rating	Hz
	I b r		A
	b r t	0.5 s	s
	b E n	nO	Hz
	b E t	0.5 s	s
L C 2 -	b I P	nO	
	L C 2	nO	
	C L 2	1.5 In ¹	A

¹ In corresponds to the nominal drive current indicated in the *ATV31 Installation Manual* and on the drive controller nameplate.



These parameters only appear if the corresponding function is enabled. They can also be accessed in the SET- menu.

Application Functions Menu (Continued)



Code	Factory Setting	Custom Setting	
P55 -	P52	If tCC = 2C: LI3 If tCC = 3C: LI4 If tCC = LOC: LI3	
	P54	If tCC = 2C: LI4 If tCC = 3C: nO If tCC = LOC: LI4	
	P58	nO	
	P516	nO	
	SP2	10 Hz	Hz
	SP3	15 Hz	Hz
	SP4	20 Hz	Hz
	SP5	25 Hz	Hz
	SP6	30 Hz	Hz
	SP7	35 Hz	Hz
	SP8	40 Hz	Hz
	SP9	45 Hz	Hz
	SP10	50 Hz	Hz
	SP11	55 Hz	Hz
	SP12	60 Hz	Hz
	SP13	70 Hz	Hz
SP14	80 Hz	Hz	
SP15	90 Hz	Hz	
SP16	100 Hz	Hz	

Code	Factory Setting	Custom Setting	
CHP -	CHP	nO	
	UnSP2	Varies with drive controller rating	V
	FrsP2	50 Hz	Hz
	nCrP2	Varies with drive controller rating	A
	nSP2		RPM
	CDSP2		
	UFtP2	n	
	UFrP2	20%	%
	FLGP2	20%	%
	StAP2	20%	%
	SLP2	100 Hz	Hz
	LSt -	LAF	nO
LAr		nO	
LAS		nSt	




These parameters only appear if the corresponding function is enabled. They can also be accessed in the SEt- menu.

Fault Menu 

Code	Factory Setting	Custom Setting
<i>R L r</i>	nO	
<i>L R r</i>	5	
<i>r S F</i>	nO	
<i>F L r</i>	nO	
<i>E L F</i>	nO	
<i>E P L</i>	YES	
<i>D P L</i>	YES	
<i>I P L</i>	YES	
<i>D H L</i>	YES	
<i>D L L</i>	YES	

Code	Factory Setting	Custom Setting
<i>S L L</i>	YES	
<i>C D L</i>	YES	
<i>t n L</i>	YES	
<i>L F L</i>	nO	
<i>L F F</i>	10 Hz	Hz
<i>d r n</i>	nO	
<i>S t P</i>	nO	
<i>I n H</i>	nO	
<i>r P r</i>	nO	

 These parameters only appear if the corresponding function is enabled.

Communication Menu 

Code	Factory Setting	Custom Setting
<i>R d d</i>	1	
<i>t b r</i>	19200	
<i>t F D</i>	8E1	
<i>t t D</i>	10 s	s
<i>R d C D</i>	0	

Code	Factory Setting	Custom Setting
<i>b d C D</i>	125	
<i>F L D</i>	nO	
<i>F L D C</i>	A11 AIP for ATV31*****A	