ACCel500 FREQUENCY CONVERTERS
REGENERATIVE SUPPLY
UNIT APPLICATION

Cleveland, Ohio

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REGENERATIVE SUPPLY UNIT APPLICATION

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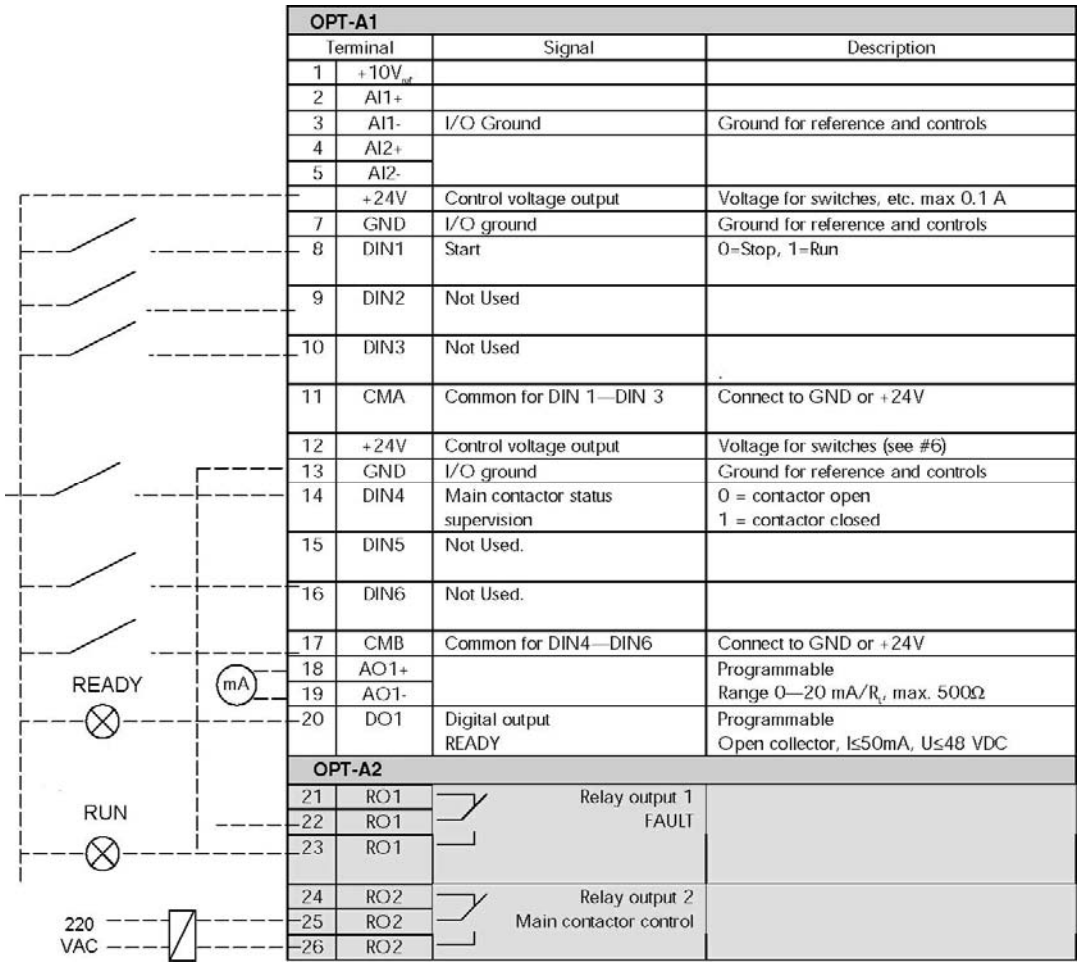
SECTION I

INTRODUCTION

The Regenerative Application is easy and flexible to use due to its versatile fieldbus features. It is the only application for the regenerative unit. Due to continuous development the list of parameter might change. The parameters of the Regenerative Application are explained in Section III of this manual.

Control I/O



OPT-A1			
Terminal		Signal	Description
1	+10V$_{ref}$		
2	AI1+		
3	AI1-	I/O Ground	Ground for reference and controls
4	AI2+		
5	AI2-		
	+24V	Control voltage output	Voltage for switches, etc. max 0.1 A
7	GND	I/O ground	Ground for reference and controls
8	DIN1	Start	0=Stop, 1=Run
9	DIN2	Not Used	
10	DIN3	Not Used	
11	CMA	Common for DIN 1—DIN 3	Connect to GND or +24V
12	+24V	Control voltage output	Voltage for switches (see #6)
13	GND	I/O ground	Ground for reference and controls
14	DIN4	Main contactor status supervision	0 = contactor open 1 = contactor closed
15	DIN5	Not Used.	
16	DIN6	Not Used.	
17	CMB	Common for DIN4—DIN6	Connect to GND or +24V
18	AO1+		Programmable Range 0—20 mA/R$_L$, max. 500Ω
19	AO1-		
20	DO1	Digital output READY	Programmable Open collector, I≤50mA, U≤48 VDC
OPT-A2			
21	RO1	Relay output 1 FAULT	
22	RO1		
23	RO1		
24	RO2	Relay output 2 Main contactor control	
25	RO2		
26	RO2		

Figure 1-1. Basic Application Default I/O Configuration

SECTION II

REGENERATIVE APPLICATION – PARAMETER LISTS

On the pages that follow, you will find the lists of parameters within the respective parameter groups. The parameter descriptions are given in Section III.

Column Explanations:

Code	=	Location indication on the keypad; shows the operator the present parameter number
Parameter	=	Name of parameter
Min	=	Minimum value of parameter
Max	=	Maximum value of parameter
Unit	=	Unit of parameter value; given if available
Default	=	Value preset by factory
Cust	=	Customer's own setting
ID	=	ID number of the parameter (used with PC tools)
	=	Parameter value can only be changed after the frequency converter has been stopped.

IMPORTANT:

Configuration information in this manual is provided to assist users in designing their own operational/functional schemes. It is deemed to be correct, however, if any errors or omissions exist, Avtron and/or Avtron representatives will not be liable to provide "warranty" on-site support. If one is designing his own configuration, or using one of the examples, it is highly recommended to test the operation prior to putting the drive into production.

2-1 MONITORING VALUES (CONTROL KEYPAD: MENU M1)

The monitoring values are the actual values of parameters and signals as well as statuses and measurements. Monitoring values cannot be edited. See the ACCel500 Software Manual, Section II, for more information.

TABLE 2-1. MONITORING VALUES

Code	Parameter	Unit	ID	Description
V1.1	Used DC VolRef	%	1200	Used DC voltage reference by the regenerative unit in % of nominal DC voltage
V1.2	DC-Link Voltage	V	1108	Measured DC Link voltage in volts
V1.3	Total Current	A	1104	Total current of the regenerative unit in amperes
V1.4	Active Current	A	1125	Active current in % of nominal converter current
V1.5	Reactive Current	A	1157	Reactive current of the regenerative drive in % of nominal current
V1.6	U Phase Current	%	1149	RealTime U phase current 100.0 % = nominal current.
V1.7	V Phase Current	%	1150	RealTime V phase current 100.0 % = nominal current.
V1.8	W Phase Current	%	1151	RealTime W phase current 100.0 % = nominal current
V1.9	Supply Voltage	V	1107	Incoming supply voltage in Volts.
V1.10	Supply Frequency	Hz	1101	Supply frequency in ##.## Hz. The sign indicates the phase order. If FreqScale = 100, then 5000 equals 50.00 Hz. Heatsink temperature
V1.11	DIN1, DIN2, DIN3		15	Digital Inputs A1, A2, and A3 Status (sum)
V1.12	DIN4, DIN5, DIN6		1613	Digital Inputs B4, B5, and B6 Status (sum).
V1.13	DO1, RO1, RO2		1714	Digital Output and Relay 1&2 Status (sum)
V1.14	Unit Temperature	°C	1109	Temperature of the unit in degrees Celsius
V1.15	Unit Nom Voltage	V	1117	Nominal voltage rating for the unit in volts
V1.16	Unit Nom Current	A	1118	Nominal current rating of the converter in amperes
V1.17	Unit Nom Power	kW	1119	Nominal power rating of the converter in kW
V1.22	MainControlWord		1160	MCW from FieldBus for monitoring
V1.23	MainStatusWord		1162	Main Status Word to FieldBus for monitoring

2-2 BASIC PARAMETERS (CONTROL KEYPAD: MENU M2 → G2.1)

TABLE 2-2. BASIC PARAMETERS

Code	Parameter	Min	Max	Unit	Default	Cust	ID	Note
P2.1.1	Supply Voltage	0.00	1000	V	0.00		1201	
P2.1.2	DCVoltReference	105.00%	120 % for 500V 115 % for 690V	V	110.00 %		1462	DC Voltage reference as % of nominal DC voltage
P2.1.3	Current Limit	0.00	UnitVTCurrent	A	7		107	Total current limit in amperes
P2.1.4	MainCont ACK Sel	0	1		0		1453	Main Contactor Acknowledgement Select 0 = Not Select 1 = DIN4
P2.1.5	DO1 Ctrl	0	9		7 0		1216	Signal selection for the digital indication through DO1
P2.1.6	RO1 Ctrl	0	9		0		112	Signal selection for the digital indication through DO1
P2.1.7	Start function	0	1		0		1274	0= Regenerative unit starts only with the run request 1= Regenerative unit can start if the DC bus voltage starts increasing.
P2.1.8	Stop function	0	1		0		1275	0= Normal. The regenerative unit stops modulation with removal of RUN Request 1= When NoRegen. After the removal of RUN request, the regenerative unit stops modulating if there is no regeneration taking place.
P2.1.9	Input Phase Supervision	0	12		0		1330	Action in case of loss of input phase
P2.1.10	Earth Fault	0			1		1332	Action in case of earth fault
P2.1.11	Earth Fault Curr.	0.0	100	%	50.0		1333	Max level of earth current in % of unit current.

2-3 DRIVE CONTROL PARAMETERS (CONTROL KEYPAD: MENU M2 → G2.2)

TABLE 2-3. DRIVE CONTROL PARAMETERS

Code	Parameter	Min	Max	Unit	Default	Cust	ID	Note
P2.2.1	Voltage Ctrl Kp	0	32000		100		1451	Gain for the DC voltage controller of the unit
P2.2.2	Voltage Ctrl Ti	0	1000	ms	50.00		1452	Integral time for the DC voltage controller of the regenerative unit
P2.2.3	Active Current Kp	0	4000		400		1455	Regen active current controller gain. Init = 400
P2.2.4	Active Current Ti	0	1000	ms	15		1456	Regen active current controller integral time
P2.2.5	SyncKp	0	32000		2000		1457	Regen synchronization gain
P2.2.6	SyncTi	0	1000	ms	4		1458	Regen synchronization integral time
P2.2.7	Restart Delay	0	32000	ms	0		1281	Minimum time between previous stop command and next start request to start the Regen Unit.
P2.2.8	Stop Delay	0	32000	ms	0		1282	Off time delay between removal of RUN request and stopping of the modulation of the regenerative unit.
P2.2.9	Reactive Curr Ref	0.0	100.0	%	0,0		1459	Regenerative reactive current reference 1000 = nominal current
P2.2.10	Capacitor size	0.0	100.0	%	5,0		1460	Regenerative filter capacitor size in %
P2.2.11	Inductor size	0.0	100.0	%	10,0		1461	Regenerative filter inductor size in %
P2.2.12	DCVoltSupervLim	0	1000	V	600		1454	DC voltage supervision limit
P2.2.13	Switching freq	3.0	16.0	kHz	10,0		601	Switching frequency
P2.2.14	CanBus Node No.	1	255		1		1269	Drive ID number for the CANbus monitoring tool

2-4 SYSTEM MENU (CONTROL KEYPAD: MENU M6)

For parameters and functions related to the general use of the frequency converter, such as application and language selection, customized parameter sets, or information about the hardware and software, see Section II in the ACCel500 Software Manual.

2-5 EXPANDER BOARDS (CONTROL KEYPAD: MENU M7)

The M7 menu shows the expander and option boards attached to the control board and board-related information. For more information, see Section II in the ACCel500 Software Manual.

SECTION III

PARAMETER DESCRIPTIONS

3-1 BASIC PARAMETERS

2.1.1 Supply Voltage

Sets the incoming line voltage for the regenerative drive. The maximum value is 1000V. Set this parameter to the nominal line voltage at the installation site.

2.1.2 DCVoltReference

Sets the DC Voltage reference in % of nominal DC voltage. The DC Voltage will be maintained at this level when regen unit is running. For 500V units, the maximum limit is 120% and for 690V units, the maximum limit is 115%.

2.1.3 Current Limit

Sets the current limit for the regenerative supply unit. Set this to correspond to the nominal load of the unit, bearing in mind that the load might consist of several motor drive units. Maximum value corresponds to the rated current of the unit.

2.1.4 MainCont Ack Sel

This parameter defines if the drive monitors the status of the main contactor of the unit. If the monitoring function is used, the unit monitors the status and will not start if the state of the contactor does not correspond to the required status, that is, is open when it should be shut.

0: Not in use
1: DIN4 is used for the monitoring

2.1.5 DO1 Ctrl

This parameter defines which signal is connected to digital output 1.

0 = Can be set from Fieldbus in Main Control word
1 = Ready
2 = Running
3 = Fault
4 = No Fault
5 = Warning
6 = At ref
7 = Regen Active
8 = Mcont ON FB (Main contactor close from FieldBus)
9 = E-stop active

2.1.6 RO1 Ctrl

This parameter defines which signal is connected to digital output 1.

0 = Can be set from Fieldbus in Main Control word
1 = Ready
2 = Running
3 = Fault
4 = No Fault
5 = Warning
6 = At ref
7 = Regen Active
8 = Mcont ON FB (Main contactor close from FieldBus)
9 = E-stop active

2.1.7 Start Function

The parameter determines how the unit behaves when starting.

0 = The unit starts when the START signal is applied through Dix.
1 = The unit can start when the DC link value starts increasing.

2.1.8 Stop Function

The parameter determines how the unit behaves when stopping.

0 = The unit stops when the START signal is removed from Dix.
1 = WhenNoRegen. The unit stops when no regeneration is taking place after removal of the START request from Dix.

2.1.9 Input Phase Supervision

Defines how the drive behaves if it detects that one supply phase is missing.

0= No action
1 = Stop as defined by parameter 2.1.7.

2.1.10 Earth Fault

Defines how the drive behaves if it detects an earth fault.

0= No action
1 = Stop as defined by parameter 2.1.7.

2.1.11 Earth Fault Current

The parameter determines the earth fault current trip level in % of the unit rated current.

3-2 DRIVE CONTROL

NOTE: For advanced system users only. The parameters in this group should not normally be changed. Contact factory before you do any changes in these parameters.

2.2.1 Voltage Ctrl Kp

This parameter sets the gain for the DC link PI voltage controller.

2.2.2 Voltage Ctrl Ti

This parameter sets the time constant in ms of the DC link PI controller.

2.2.3 Active Curr Kp

This parameter sets the gain of the controller for the active current of the regenerative unit.

2.2.4 Active Curr Ti

This parameter sets the time constant in ms of the controller for the active current of the regenerative unit.

2.2.5 Sync Kp

This parameter sets the gain of the synchronization controller used to synchronize the switching to the supply.

2.2.6 Sync Ti

This parameter set the time constant in ms of the controller used to synchronize the switching to the supply

2.2.7 Restart Delay

Sets the minimum time delay between the previous stop command and the next start request to start the regen unit.

2.2.8 Stop Delay

Sets the delay between the detection of loss of RUN signal and the actual stop of the switching of the IGBT bridge.

2.2.9 Reactive Current Reference

Sets the reference for the reactive current in % of the nominal current. This can be used to set a desired cos phi.

2.2.10 Capacitor Size

Sets the value of the capacitors used in the input LCL filter as a %. 100 % = at nominal voltage, the current in the capacitor is 100 % of the nominal current.

2.2.11 Inductor Size

Sets the value of the inductors used in the LCL filter as a %. 100 % = at nominal current, the voltage across the inductor is 100 % of the nominal voltage.

2.2.12 DC Voltage Supervision Limit

Sets a supervision limit for the DC link voltage. If the voltage increases above this, the signal goes HIGH and can be connected to an output (DO1 or RO1).

2.2.13 Switching Frequency

The switching frequency of the IGBT bridge in kHz. Changing the default value may impact on the LCL filter operation.

2.2.14 CanBus Node No.

Sets the address of the unit when you use the CANbus to monitor the unit function.

3-3 MONITOR SETTINGS

2.3.1 DAC Ctrl

Control of DAC variables. There are four D/A channels available to freely configure to monitor the signals from the drive if the internal addresses (32-bit) are known.

0 = Disable
1= Enable

NOTE: The use of DAC channels is limited for factory testing.

2.3.2 Ch1 Addr Hi

Address for the Ch1 higher integer in decimal.

2.3.3 Ch1 Addr Lo

Address for the Ch1 lower integer in decimal.

2.3.4 Ch2 Addr Hi

Address for the Ch2 higher integer in decimal.

2.3.5 Ch2 Addr Lo

Address for the Ch2 lower integer in decimal.

2.3.6 Ch3 Addr Hi

Address for the Ch3 higher integer in decimal.

2.3.7 Ch3 Addr Lo

Address for the Ch3 lower integer in decimal.

2.3.8 Ch4 Addr Hi

Address for the Ch4 higher integer in decimal.

2.3.9 Ch4 Add Lo

Address for the Ch4 lower integer in decimal.

2.3.10 PD OUT1 ID

ID no. of a parameter or signal to be connected to process data out 1.

2.3.11 PD OUT2 ID

ID no. of a parameter or signal to be connected to process data out 2.

2.3.12 PD OUT3 ID

ID no. of a parameter or signal to be connected to process data out 3.

2.3.13 PD OUT4 ID

ID no. of a parameter or signal to be connected to process data out 4.

2.3.14 PD OUT5 ID

ID no. of a parameter or signal to be connected to process data out 5.

2.3.15 PD OUT6 ID

ID no. of a parameter or signal to be connected to process data out 6.

2.3.16 PD OUT7 ID

ID no. of a parameter or signal to be connected to process data out 7.

2.3.17 PD OUT8 ID

ID no. of a parameter or signal to be connected to process data out 8.

2.3.18 PD OUT9 ID

ID no. of a parameter or signal to be connected to process data out 9.

2.3.19 PD OUT10 ID

ID no. of a parameter or signal to be connected to process data out 10.

NOTE: The process data out signals can be read cyclically from the fieldbus.