



Macro Guide

Affinity

Model sizes 1 to 6

Building Automation HVAC/R
drive

Part Number: 0474-0010-01

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www.controltechniques.com

General Information

The manufacturer accepts no liability for any consequences resulting from inappropriate, negligent or incorrect installation or adjustment of the optional parameters of the equipment or from mismatching the variable speed drive with the motor.

The contents of this guide are believed to be correct at the time of printing. In the interests of commitment to a policy of continuous development and improvement, the manufacturer reserves the right to change the specification of the product or its performance, or the content of the guide without notice.

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Macro version

This document refers to the version of macros stored on the SMARTCARD[®] part number 2214-3246-01.

Drive software version

This product is supplied with the latest version of user-interface and machine control software. If this product is to be used in a new or existing system with other drives, there may be some differences between their software and the software in this product. These differences may cause the product to function differently. This may also apply to drives returned from the Control Techniques Service Centre.

If there is any doubt, please contact your local Control Techniques Drive Centre or Distributor. Make sure that you have the details of the software version available.

Environmental Statement

Control Techniques is committed to minimising the environmental impacts of its manufacturing operations and of its products throughout their life cycle. To this end, we operate an Environmental Management System (EMS) which is certified to the International Standard ISO 14001. Further information on the EMS, our Environment Policy and other relevant information is available on request, or can be found at www.greendrives.com.

The electronic variable speed drives manufactured by Control Techniques have the potential to save energy and (through increased machine/process efficiency) reduce raw material consumption and scrap throughout their long working lifetime. In typical applications, these positive environmental effects far outweigh the negative impacts of product manufacture and end-of-life disposal.

Nevertheless, when the products eventually reach the end of their useful life, they can very easily be dismantled into their major component parts for efficient recycling. Many parts snap together and can be separated without the use of tools, while other parts are secured with conventional screws. Virtually all parts of the product are suitable for recycling.

Product packaging is of good quality and can be re-used. Large products are packed in wooden crates, while smaller products come in strong cardboard cartons which themselves have a high-recycled fibre content. If not re-used, these containers can be recycled. Polythene, used on the protective film and bags from wrapping product, can be recycled in the same way. Control Techniques' packaging strategy favours easily recyclable materials of low environmental impact, and regular reviews identify opportunities for improvement.

When preparing to recycle or dispose of any product or packaging, please observe local legislation and best practice.

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1 Safety Information

1.1 Warnings, Cautions and Notes



A Warning contains information which is essential for avoiding a safety hazard.

WARNING



A Caution contains information which is necessary for avoiding a risk of damage to the product or other equipment.

CAUTION

NOTE

A Note contains information which helps to ensure correct operation of the product.

1.2 Electrical safety - general warning

The voltages used in the drive can cause severe electrical shock and/or burns, and could be lethal. Extreme care is necessary at all times when working with or adjacent to the drive.

Specific warnings are given at the relevant places in this User Guide.

1.3 System design and safety of personnel

The drive is intended as a component for professional incorporation into complete equipment or a system. If installed incorrectly, the drive may present a safety hazard.

The drive uses high voltages and currents, carries a high level of stored electrical energy, and is used to control equipment which can cause injury.

Close attention is required to the electrical installation and the system design to avoid hazards either in normal operation or in the event of equipment malfunction. System design, installation, commissioning/start-up and maintenance must be carried out by personnel who have the necessary training and experience. They must read this safety information and this User Guide carefully.

The STOP function of the drive do not isolate dangerous voltages from the output of the drive or from any external option unit. The supply must be disconnected by an approved electrical isolation device before gaining access to the electrical connections.

None of the drive functions must be used to ensure safety of personnel, i.e. they must not be used for safety-related functions.

Careful consideration must be given to the functions of the drive which might result in a hazard, either through their intended behavior or through incorrect operation due to a fault. In any application where a malfunction of the drive or its control system could lead to or allow damage, loss or injury, a risk analysis must be carried out, and where necessary, further measures taken to reduce the risk - for example, an over-speed protection device in case of failure of the speed control, or a fail-safe mechanical brake in case of loss of motor braking.

1.4 Environmental limits

Instructions in this User Guide regarding transport, storage, installation and use of the drive must be complied with, including the specified environmental limits. Drives must not be subjected to excessive physical force.

1.5 Compliance with regulations

The installer is responsible for complying with all relevant regulations, such as national wiring regulations, accident prevention regulations and electromagnetic compatibility (EMC) regulations. Particular attention must be given to the cross-sectional areas of conductors, the selection of fuses or other protection, and protective earth (ground) connections.

This User Guide contains instruction for achieving compliance with specific EMC standards.

Within the European Union, all machinery in which this product is used must comply with the following directives:

98/37/EC: Safety of machinery.

89/336/EEC: Electromagnetic Compatibility.

1.6 Motor

Ensure the motor is installed in accordance with the manufacturer's recommendations. Ensure the motor shaft is not exposed.

Standard squirrel cage induction motors are designed for single speed operation. If it is intended to use the capability of the drive to run a motor at speeds above its designed maximum, it is strongly recommended that the manufacturer is consulted first.

Low speeds may cause the motor to overheat because the cooling fan becomes less effective. The motor should be installed with a protection thermistor. If necessary, an electric forced vent fan should be used.

The values of the motor parameters set in the drive affect the protection of the motor. The default values in the drive should not be relied upon.

It is essential that the correct value is entered in parameter **0.46** motor rated current. This affects the thermal protection of the motor.

1.7 Adjusting parameters

Some parameters have a profound effect on the operation of the drive. They must not be altered without careful consideration of the impact on the controlled system. Measures must be taken to prevent unwanted changes due to error or tampering.

2 Macros

2.1 Introduction

A macro is a simple and easy way of pre-configuring the drive parameters for a specific application. The following set of core macros are pre-programmed in the Affinity SMARTCARD and can be loaded to the drive using a few simple steps.

When a macro is loaded, all parameters, other than those set by the macro, will be set to their default values. Macros 6501 and 6502 load 50Hz defaults and macros 6601, 6602, 6603 and 6604 load 60Hz defaults. Motor nameplate details must be entered after the macro has been loaded (refer to macro sections below).

Table 2-1 Core macros numbers

Macro Number	Description
6501	Fan Control (Eur) - No Bypass (Eur, 50 Hz)
6502	Pump Control (Eur) - No Bypass (Eur, 50 Hz)
6601	Fan Control (US) - No Bypass (USA, 60 Hz)
6602	Pump Control (US) - No Bypass (USA, 60 Hz)
6603	Fan Control (US) - With Bypass (USA, 60 Hz)
6604	Pump Control (US) - With Bypass (USA, 60 Hz)

The drive will be ready to run the specific application when a macro is loaded and the motor power and control wirings completed (as shown in the independent macro sections below).

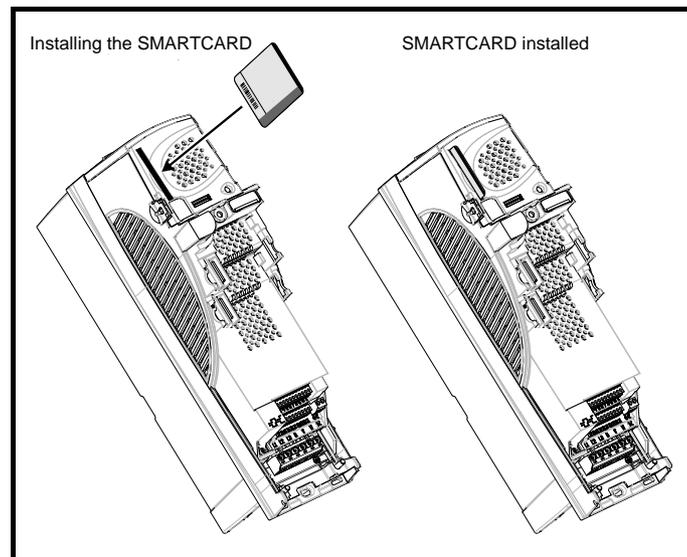
The drive defaults to V/Hz control mode.

2.2 How to load a macro

To program a macro into an Affinity building automation drive, follow these steps:

1. Remove the front keypad.
2. Insert the Affinity SMARTCARD into the slot with the metallic contacts facing the right hand side of the drive (see Figure 2-1 *Installation of the SMARTCARD*). The SMARTCARD can be fitted or removed while the drive is powered up.
3. Re-fit the keypad.
4. Set Pr. **0.00** equal to the macro number corresponding to the particular macro (e.g.. 6501 for Fan Control – No Bypass)
5. Press the Reset button. The macro will be loaded into the drive and Pr **0.00** will reset to zero.
6. Save values by setting Pr. **0.00** = 1000. Then press the drive Reset button.

Figure 2-1 Installation of the SMARTCARD



2.3 Common macro parameters

Table 2-2 lists the menu 0 parameters that are common for all macros

Table 2-2 Common Menu 0 parameters macros

Parameter			Range(⇅)		Default(⇄)	
			OL	RFC	OL	RFC
0.00	xx.00	{x.00}	0 to 32,767		0	
0.01	Minimum reference clamp	{1.07}	±3,000.0Hz	±SPEED_LIMIT_MAX Hz/rpm	0.0	
0.02	Maximum reference clamp	{1.06}	0 to 3,000.0Hz	SPEED_LIMIT_MAX Hz/rpm	EUR> 50.0 USA> 60.0	EUR> 1,500.0 USA> 1800.0
0.03	Acceleration rate	{2.11}	0.0 to 3,200.0 s/100Hz	0.000 to 3,200.000 s/1,000rpm	EUR> 40.0 USA> 33.3	EUR> 13.333 USA> 11.111
0.04	Deceleration rate	{2.21}	0.0 to 3,200.0 s/100Hz	0.000 to 3,200.000 s/1,000rpm	EUR> 40.0 USA> 33.3	EUR> 13.333 USA> 11.111
0.05	Reference select	{1.14}	A1.A2 (0), A1.Pr (1), A2.Pr (2), Pr (3), PAd (4), Prc (5)		A1.A2 (0)	
0.06	Current limit	{4.07}	0 to CURRENT_LIMIT_MAX %		110	
0.07	OL> Voltage mode select	{5.14}	Ur_S (0), Ur (1), Fd (2), Ur_Auto (3), Ur_I (4), SrE (5)		Fd (2)	
	RFC> Speed controller P gain	{3.10}		0.0000 to 6.5535 1/rad s-1		0.0300
0.08	OL> Voltage boost	{5.15}	0.0 to 25.0% of motor rated voltage		Size 1 to 3: 3.0 Size 4 & 5: 2.0 Size 6: 1.0	
	RFC> Speed controller I gain	{3.11}		0.00 to 655.35 1/rad		0.10
0.09	OL> Dynamic V/F	{5.13}	OFF (0) or On (1)		OFF (0)	
	RFC> Speed controller D gain	{3.12}		0.00000 to 0.65535 (s)		0.00000
0.10	OL> Estimated motor speed	{5.04}	±180,000 rpm			
	RFC> Motor speed	{3.02}		±SPEED_MAX rpm		
0.11	Drive output frequency	{5.01}	±SPEED_FREQ_MAX Hz	±1250 Hz		
0.12	Total motor current	{4.01}	0 to DRIVE_CURRENT_MAX A			
0.13	Percentage load	{4.20}	±USER_CURRENT_MAX %			
0.14	Ramp mode select	{2.04}	FAST (0) Std (1) Std.hV (2)	FAST (0) Std (1)	Std (1)	
0.15	Sleep/wake threshold	{6.53}	±SPEED_FREQ_MAX Hz/rpm		0.0	
0.16	Sleep/wake delay time	{6.54}	0.0 to 250.0 s		10.0	
0.17	RFC> Current demand filter 1	{4.12}		0.0 to 25.0 ms		0.0
0.18	Spin start boost	{5.40}	0.0 to 10.0		1.0	
0.19	Analog input 2 mode	{7.11}	0-20 (0), 20-0 (1), 4-20tr (2), 20-4tr (3), 4-20 (4), 20-4 (5), VOLt (6)		4-20 (4)	
0.20	Analog input 2 destination	{7.14}	Pr 0.00 to Pr 50.99		Pr 1.37	
0.21	Analog input 3 mode	{7.15}	0-20 (0), 20-0 (1), 4-20tr (2), 20-4tr (3), 4-20 (4), 20-4 (5), VOLt (6), th.SC (7), th (8), th.diSp (9)		VOLt (6)	
0.22	Date	{6.16}	0 to 311299			
0.23	Time	{6.17}	0.00 to 23.59			
0.24	Date/Time selector	{6.19}	0 to 5		3	
0.25	Date format	{6.20}	Std (0), Std.ds (1), US (2), US.ds (3)		EUR> Std (0), USA> US (2)	
0.26	Low load detection level	{4.27}	0.0 to 100.0 %		0.0	
0.27	Low load detection speed / frequency threshold	{4.28}	0.0 to +SPEED_FREQ_MAX Hz/rpm		0.0	
0.28	Trip on abnormal load detection	{4.29}	OFF (0) or On (1)		OFF (0)	
0.29	SMARTCARD parameter data	{11.36}	0 to 999		0	
0.30	Parameter cloning	{11.42}	nonE (0), rEAd (1), Prog (2), AutO (3), boot (4)		nonE (0)	
0.31	Drive rated voltage	{11.33}	200 (0), 400 (1), 575 (2), 690 (3) V			
0.32	Drive current scaling	{11.32}	0.00 to 9999.99A			
0.33	Catch a spinning motor	{6.09}	0 to 3	0 to 1	0	1
0.34	User security code	{11.30}	0 to 999		0	
0.35	PC comms mode	{11.24}	AnSI (0), rU (1), Lcd (2)		rU (1)	
0.36	PC comms baud rate	{11.25}	300 (0), 600 (1), 1200 (2), 2400 (3), 4800 (4), 9600 (5), 19200 (6), 38400 (7), 57600 (8) Modbus RTU only, 115200 (9) Modbus RTU only		19200 (6)	
0.37	PC comms address	{11.23}	0 to 247		1	
0.38	Hold zero speed / Motor pre-heat enable	{6.08}	OFF (0) or On (1)		OFF (0)	
0.39	Motor pre-heat current magnitude	{6.52}	0 to 100 %		0	
0.40	Autotune	{5.12}	0 to 2	0 to 4	0	
0.41	Maximum switching frequency	{5.18}	3 (0), 4 (1), 6 (2), 8 (3), 12 (4), 16 (5) kHz		3 (0)	
0.42	No. of motor poles	{5.11}	0 to 60 (Auto to 120 pole)		0 (Auto)	

Parameter		Range(⇅)		Default(⇔)	
		OL	RFC	OL	RFC
0.43	Motor rated power factor {5.10}	0.000 to 1.000		0.850	
0.44	Motor rated voltage {5.09}	0 to AC_VOLTAGE_SET_MAX V		200V drive: 230 400V drive: EUR> 400, USA> 460 575V drive: 575 690V drive: 690	
0.45	Motor rated full load speed (rpm) {5.08}	0 to 180,000 rpm	0.00 to 40,000.00 rpm	EUR> 1,500 USA> 1,800	EUR> 1,450.00 USA> 1,770.00
0.46	Motor rated current {5.07}	0 to RATED_CURRENT_MAX A		Drive rated current [11.32]	
0.47	Rated frequency {5.06}	0 to 3,000.0 Hz	0 to 1,250.0 Hz	EUR> 50.0 USA> 60.0	
0.48	Operating mode selector {11.31}	OPEn LP (1), RFC (2),		OPEn LP (1)	RFC (2)
0.49	Security status {11.44}	L1 (0), L2 (1), Loc (2)			
0.50	Software version {11.29}	1.00 to 99.99			
0.51	Positive logic select {8.29}	OFF (0) or On (1)		On (1)	
0.52	Timer 1 start date {9.35}	0 to 311299		0	
0.53	Timer 1 start time {9.36}	0.00 to 23.59		0.00	
0.54	Timer 1 stop date {9.37}	0 to 311299		0	
0.55	Timer 1 stop time {9.38}	0.00 to 23.59		0.00	
0.56	Timer 1 repeat function {9.39}	0 to 6		0	
0.57	Timer 1 enable {9.40}	OFF (0) or On (1)		OFF (0)	
0.58	Timer 1 destination {9.43}	Pr 0.00 to Pr 50.99		Pr 0.00	

Key:

Coding	Attribute
OL	Open loop
RFC	RFC mode

3 Macros 6501/6502

3.1 Overview

These macros set up the drive to control a fan or pump motor when there is no electronic bypass arrangement in place and 50 Hz default settings are required. The drive will be set to operate in open loop mode when either macro is loaded.

The only difference between the two macros is the default value settings for acceleration/deceleration rates and minimum/maximum frequencies.

Table 3-1 Fan/Pump Control – No Bypass (Eur, 50 Hz)

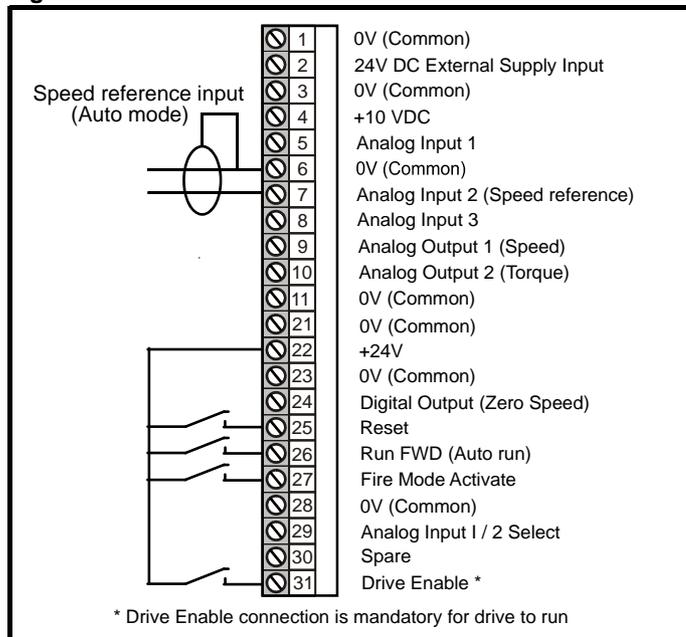
Parameter	Fan Control	Pump Control
Minimum frequency	12 Hz	5 Hz
Maximum frequency	50 Hz	50 Hz
Time to ramp up to 50Hz	60 sec	10 sec
Time to ramp down from 50Hz	60 sec	10 sec

The following sections detail the user control wiring connections, parameter settings and sequence of operations for these macros.

3.2 User control terminal wiring

The auto run, enable and speed references are wired to the drive control terminals as shown below.

Figure 3-1 Drive control terminals



NOTE

By default, analog input 2 is configured to accept a 4 ma to 20 mA signal. Other reference types such as 0 ma to 20 mA, 0 Volt to 10 Volt etc can be selected by changing Pr **0.19**.

3.3 Parameter setting

After loading the macro (refer to section 2.2 *How to load a macro* on page 5), the Motor Nameplate parameters must be programmed in the drive. The optional parameters allow the maximum/minimum frequency reference and acceleration/deceleration rates to be modified for individual applications. The value for motor rated full load speed must be entered in Pr **0.45**, if the voltage mode (Pr **0.07**) is not set to fixed boost mode (Fd).

Motor Nameplate

1. Motor rated voltage – Pr **0.44**.
2. Motor rated current – Pr **0.46**.
3. Motor rated frequency – Pr **0.47**.

Optional

1. Minimum frequency reference – Pr **0.01**.
2. Maximum frequency reference – Pr **0.02**.
3. Acceleration rate (sec/100Hz) – Pr **0.03**.
4. Deceleration rate (sec/100Hz) – Pr **0.04**.
5. Motor rated full load speed – Pr **0.45**.

After setting the parameters, save the values by setting Pr. **0.00** = 1000 and then pressing the Reset button.

3.4 Sequence of operation

Close the Drive Enable signal (drive terminals 22 and 31). The status on the keypad changes from 'inh' to 'off' indicating that the drive is ready to run.

Hand Mode:

To run in Hand mode:

1. Press the Hand button in the drive keypad. The drive keypad displays 'hand'.
2. The motor speed can now be changed by pressing the up and down keys on the joystick.
3. Press the Off button to stop the drive. The keypad displays 'off'.
4. Press the Hand button to restart the drive.

To reset Hand mode press the Off/Reset button on the keypad.

Auto Mode:

To run in Auto mode:

1. Press the Auto button in the drive keypad and the drive is ready to accept the user Auto Run command
2. Apply the Auto Run signal (drive terminal 26) and the keypad displays 'auto'.
3. The motor speed can now be changed by altering the signal on analog input 2 (terminals 6 and 7).
4. Remove the Auto Run signal to stop the motor. The keypad displays 'rdy'.
5. Re-apply the Auto Run signal to restart the motor.
6. Press the Off/Reset button on the keypad to disable Auto mode.

3.5 Differences from defaults

Refer to Table 6-1 *Macro 6501/6502: Fan/Pump Control - No Bypass (Eur, 50 Hz)* on page 12 for details of the differences from default parameter values when macros 6501 or 6502 are loaded

4 Macros 6601/6602

4.1 Overview

These macros set up the drive to control a fan or pump motor when there is no electronic bypass arrangement in place and 60Hz default settings are required. The drive will be set to operate in open loop mode when either macro is loaded.

The only difference between the two macros is the default value settings for acceleration/deceleration rates and minimum/maximum frequencies.

Table 4-1 Fan/Pump Control – No Bypass (USA, 60 Hz)

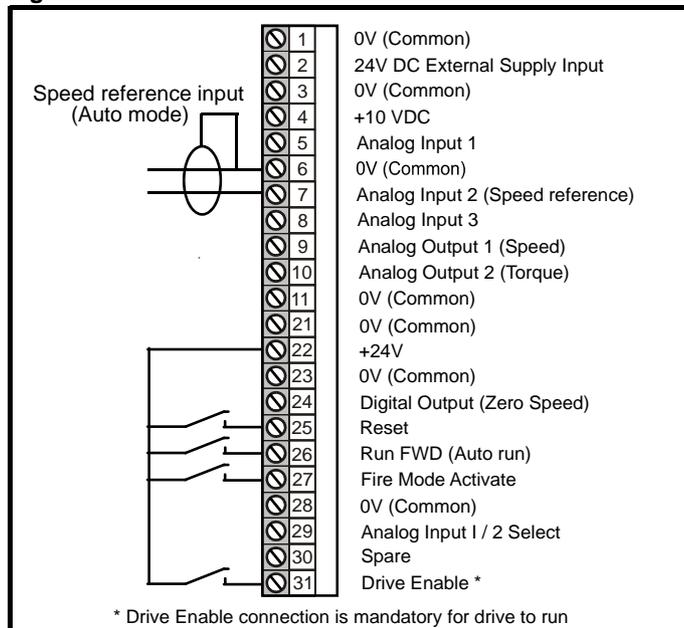
Parameter	Fan Control	Pump Control
Minimum frequency	15 Hz	6 Hz
Maximum frequency	60 Hz	60 Hz
Time to ramp up to 60Hz	60 sec	10 sec
Time to ramp down from 60Hz	60 sec	10 sec

The following sections detail the user control wiring connections, parameter settings and sequence of operations for these macros.

4.2 User control terminal wiring

The auto run, enable and speed references are wired to the drive control terminals as shown below.

Figure 4-1 Drive control terminals



NOTE

By default, analog input 2 is configured to accept a 4 ma to 20 mA signal. Other reference types such as 0 ma to 20 mA, 0 Volt to 10 Volt etc can be selected by changing Pr **0.19**.

4.3 Parameter setting

After loading the macro (refer to section 2.2 *How to load a macro* on page 5), the Motor Nameplate parameters must be programmed in the drive. The optional parameters allow the maximum/minimum frequency reference and acceleration/deceleration rates to be modified for individual applications. The value for motor rated full load speed must be entered in Pr **0.45**, if the voltage mode (Pr **0.07**) is not set to fixed boost mode (Fd).

Motor Nameplate

1. Motor rated voltage – Pr **0.44**.
2. Motor rated current – Pr **0.46**.
3. Motor rated frequency – Pr **0.47**.

Optional

1. Minimum frequency reference – Pr **0.01**.
2. Maximum frequency reference – Pr **0.02**.
3. Acceleration rate (sec/100Hz) – Pr **0.03**.
4. Deceleration rate (sec/100Hz) – Pr **0.04**.
5. Motor rated full load speed – Pr **0.45**.

After setting the parameters, save the values by setting Pr. **0.00** = 1000 and then pressing the Reset button.

4.4 Sequence of operation

Close the Drive Enable signal (drive terminals 22 and 31). The status on the keypad changes from 'inh' to 'off' indicating that the drive is ready to run.

Hand Mode

To run in Hand mode:

1. Press the Hand button in the drive keypad. The drive keypad displays 'hand'.
2. The motor speed can now be changed by pressing the up and down keys on the joystick.
3. Press the Off button to stop the drive. The keypad displays 'off'.
4. Press the Hand button to restart the drive.

To reset Hand mode press the Off/Reset button on the keypad.

Auto Mode

To run in Auto mode:

1. Press the Auto button in the drive keypad and the drive is ready to accept the user Auto Run command
2. Apply the Auto Run signal (drive terminal 26) and the keypad displays 'auto'.
3. The motor speed can now be changed by altering the signal on analog input 2 (terminals 6 and 7).
4. Remove the Auto Run signal to stop the motor. The keypad displays 'rdy'.
5. Re-apply the Auto Run signal to restart the motor.
6. Press the Off/Reset button on the keypad to disable Auto mode.

4.5 Differences from defaults

Refer to Table 6-2 *Macro 6601/6602: Fan/Pump Control - No Bypass (USA, 60 Hz)* on page 12 for details of the differences from default parameter values when macros 6601 or 6602 are loaded

5 Macros 6603/6604

5.1 Overview

These macros set up the drive to control a fan or a pump motor controlled by a Control Techniques Electronic Bypass Controller (EBC). The drive will be set to operate in open loop mode when either macro is loaded.

The only difference between the two macros is the default value settings for acceleration/deceleration rates and minimum/maximum frequencies.

Table 5-1 Macros 6603/6604 – Fan/Pump Control – With Bypass (USA, 60 Hz)

Description	Fan Control	Pump Control
Minimum frequency	15 Hz	6 Hz
Maximum frequency	60 Hz	60 Hz
Time to ramp up to 60Hz	60 sec	10 sec
Time to ramp down from 60Hz	60 sec	10 sec

The bypass controller has three operational modes (Test, VFD and Bypass) and two run modes (Hand and Auto). Refer to section 5.4 *Sequence of operation* on page 11 for details of each mode.

The following sections detail the user control wiring connections, parameter settings and sequence of operations for these macros.

5.2 User control terminal wiring

The EBC is supplied pre-wired as a three contactor bypass system along with an Affinity drive from Control Techniques. For questions about wiring schematics of the EBC to the drive, contact your local Control Techniques drive center.

The user control wiring details for the drive and EBC are shown below in Figure 5-1 *Drive control terminals* and Figure 5-2 *EBC Terminal board connections*.

Figure 5-1 Drive control terminals

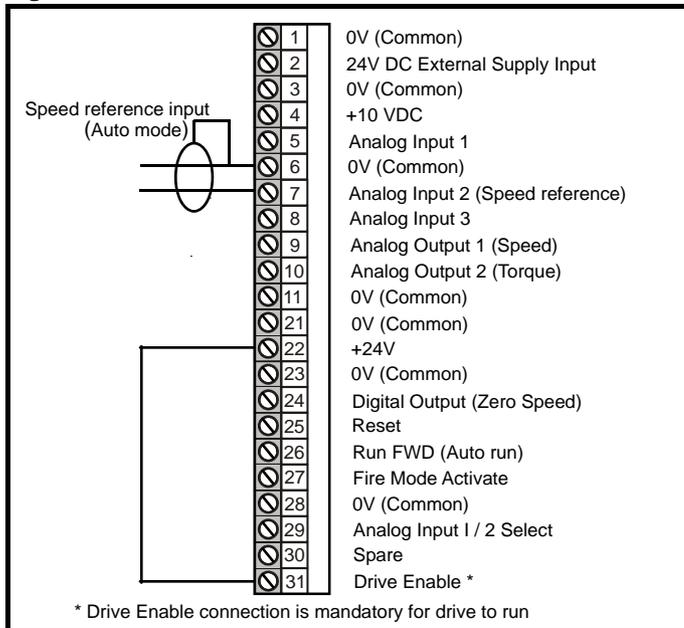
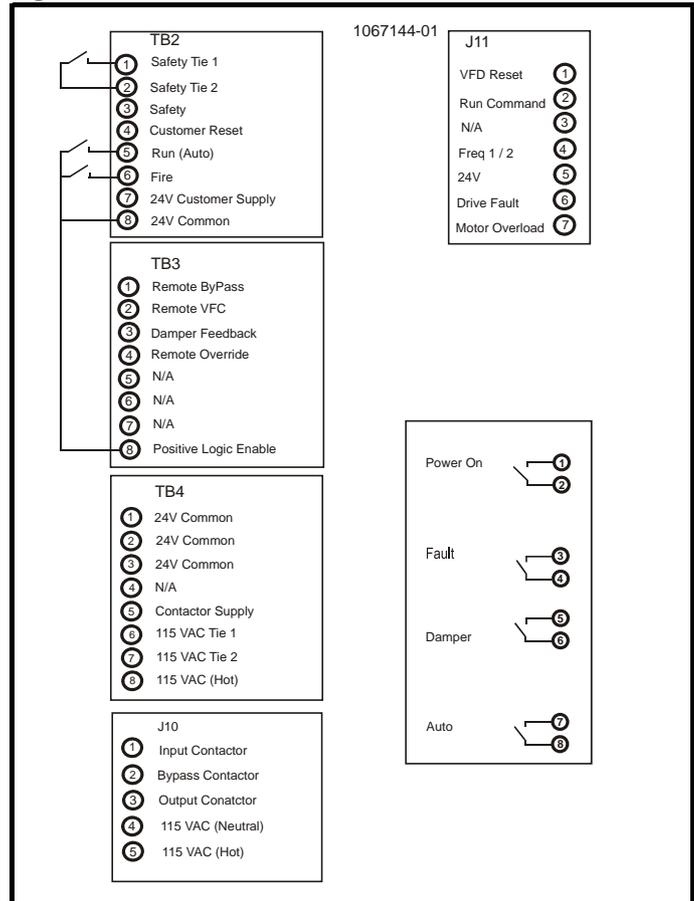


Figure 5-2 EBC Terminal board connections



5.3 Parameter setting

After loading the macro (refer to section 2.2 *How to load a macro* on page 5), the Motor Nameplate parameters must be programmed in the drive. The optional parameters allow the maximum/minimum frequency reference and acceleration/deceleration rates to be modified for individual applications. The value for motor rated full load speed must be entered in Pr **0.45**, if the voltage mode (Pr **0.07**) is not set to fixed boost mode (Fd).

Motor Nameplate

1. Motor rated voltage – Pr **0.44**
2. Motor rated current – Pr **0.46**
3. Motor rated frequency – Pr **0.47**

Optional

1. Minimum frequency reference – Pr **0.01**
2. Maximum frequency reference – Pr **0.02**
3. Acceleration rate (sec/100Hz) – Pr **0.03**
4. Deceleration rate (sec/100Hz) – Pr **0.04**

After setting the parameters, save values by setting Pr **0.00** = 1000 and then press the Reset button.

NOTE

The user speed reference is wired to drive analog input 2 (Terminals 6 and 7), which by default accepts a 4 - 20mA speed reference command. Other reference types such as 0 -10V or 0 - 20mA can be selected by changing Pr **0.19**.

The user commands are directly wired into the control terminals in the EBC as shown in Figure 5-2 *EBC Terminal board connections*.

5.4 Sequence of operation

Close the Drive Enable signal (drive terminals 22 and 31). The status on the keypad changes from 'inh' to 'rdy' indicating that the drive is ready to run.

5.4.1 Test mode

This is a maintenance mode for monitoring and editing drive parameters.

To select Test mode, press the test button on the EBC. The input contactor to the drive will close but the bypass and output contactors remain open, isolating the motor from power.

5.4.2 VFD mode

This mode allows the motor to be controlled by the Affinity drive.

To select VFD mode press the 'VFD' button on the EBC. The input and output contactors will close. The motor can now be run in either Hand or Auto mode.

Hand mode

To run in Hand mode:

1. Press the Hand button on the EBC. The motor can now be controlled from the drive keypad.
2. Press the Hand button in the drive keypad. The motor starts and the drive keypad displays 'run'.
3. The motor speed can now be changed by pressing the up and down keys on the drive joystick.
4. Press the drive Off/Reset button to stop the drive. The motor stops and the drive keypad displays 'rdy'.
5. Press the drive Hand button to restart the drive.

To reset Hand mode, press the Off/Reset button on the EBC keypad. The drive will stop and will need to be restarted from step 1 above.

Auto mode

To run in Auto mode:

1. Press the Auto button on the EBC and the drive is ready to accept the user 'Auto Run' command
2. Apply the Auto Run signal (EBC terminals 5 and 8) and the keypad displays 'run'.
3. The motor speed can now be changed by altering the signal on analog input 2 (Drive terminals 6 and 7).
4. Remove the Auto Run signal to stop the drive. The motor stops and the drive keypad displays 'rdy'.
5. Re-apply the Auto Run signal to restart the drive.

To reset Auto mode, press the Off/Reset button on the EBC keypad the drive will stop and will need to be restarted from step 1 above.

In 'Auto' mode the Hand button on the drive keypad is disabled.

5.4.3 Bypass mode

This mode bypasses the Affinity drive and runs the motor at a fixed speed.

To select Bypass mode:

1. Press the Bypass button on the EBC. The bypass contactor will remain open until either Hand or Auto mode is selected.
2. Press the Off/Reset button on the EBC to reset Bypass mode.

Hand mode

To run in Hand mode:

1. Press the Hand button on the EBC, the bypass contactor will close applying the supply voltage directly to the motor which will then run at a fixed speed.
2. Press the Off/Reset button on the EBC to reset Hand mode. The bypass contactor will open stopping the motor.

Auto mode

To run in Auto mode:

1. Press the Auto button on the EBC which will then wait for the user Auto Run command
2. Apply the Auto Run signal (at EBC terminal 5) and the bypass contactor will close applying the supply voltage directly to the motor, which will then run at a fixed speed
3. Remove the Auto Run signal and the bypass contactor will open, stopping the motor.
4. Press the Off/Reset button on the EBC to reset Auto mode. The bypass contactor will open stopping the motor.

5.5 Difference from defaults

Refer to Table 6-3 *Macro 6603/6604: Fan/Pump Control - With Bypass (USA, 60 Hz)* on page 12 for details of the differences from default parameter values when macros 6603 or 6604 are loaded.

6 Parameter differences from defaults

Table 6-1 Macro 6501/6502: Fan/Pump Control - No Bypass (Eur, 50 Hz)

Parameter		Range(†)	Macro Default(⇔)		Parameter Default(⇔)	
			Fan	Pump	OL	RFC
0.01	Minimum reference clamp {1.07}	± 3000.0 Hz	12.0 Hz	5.0 Hz	0.0	
0.03	Acceleration rate 1 {2.11}	0.0 to 300.0 s/100Hz	100.0	16.6	EUR>40.0 USA>33.3	EUR>13.333 USA>11.111
0.04	Deceleration rate 1 {2.21}	0.0 to 300.0 s/100Hz	100.0	16.6	EUR>40.0 USA>33.3	EUR>13.333 USA>11.111
0.20	T7 Analog input 2 destination {7.14}	Pr 0.00 to Pr 50.99	Pr 1.36	Pr 1.36	Pr 1.37	
1.51	Power-up keyboard control mode reference	Reset (0), lasT (1), pRs1 (2)	Last (1)	Last (1)	rRESET (0)	
1.52	Enable hand/off/auto keypad operating mode	0 to 3	Auto (1)	Auto (1)	Off (2)	
2.06	S ramp enable	OFF (0) or On (1)	On (1)	On (1)	Off (0)	
2.07	S ramp acceleration limit	0.0 to 300.0 s ² /100Hz	50.0	16.6	3.1	1.5
6.49	Enable Date/Time in trip log	OFF (0) or On (1)	On (1)	On (1)	Off (0)	
7.10	T5/6 Analog input destination	Pr 0.00 to Pr 50.99	Pr 0.00	Pr 0.00	Pr 1.36	

Table 6-2 Macro 6601/6602: Fan/Pump Control - No Bypass (USA, 60 Hz)

Parameter		Range(†)	Macro Default(⇔)		Parameter Default(⇔)	
			Fan	Pump	OL	RFC
0.01	Minimum reference clamp {1.07}	± 3000.0 Hz	15.0 Hz	6.0 Hz	0.0	
0.03	Acceleration rate 1 {2.11}	0.0 to 300.0 s/100Hz	100.0	16.6	EUR>40.0 USA>33.3	EUR>13.333 USA>11.111
0.04	Deceleration rate 1 {2.21}	0.0 to 300.0 s/100Hz	100.0	16.6	EUR>40.0 USA>33.3	EUR>13.333 USA>11.111
0.20	T7 Analog input 2 destination {7.14}	Pr 0.00 to Pr 50.99	Pr 1.36	Pr 1.36	Pr 1.37	
1.51	Power-up keyboard control mode reference	Reset (0), lasT (1), pRs1 (2)	Last (1)	Last (1)	rRESET (0)	
1.52	Enable hand/off/auto keypad operating mode	0 to 3	Auto (1)	Auto (1)	Off (2)	
2.06	S ramp enable	OFF (0) or On (1)	On (1)	On (1)	Off (0)	
2.07	S ramp acceleration limit	0.0 to 300.0 s ² /100Hz	60.0	16.6	3.1	1.5
6.49	Enable Date/Time in trip log	OFF (0) or On (1)	On (1)	On (1)	Off (0)	
7.10	T5/6 Analog input destination	Pr 0.00 to Pr 50.99	Pr 0.00	Pr 0.00	Pr 1.36	

Table 6-3 Macro 6603/6604: Fan/Pump Control - With Bypass (USA, 60 Hz)

Parameter		Range(†)	Macro Default(⇔)		Parameter Default(⇔)	
			Fan	Pump	OL	RFC
0.01	Minimum reference clamp {1.07}	± 3000.0 Hz	15.0 Hz	6.0 Hz	0.0	
0.03	Acceleration rate 1 {2.11}	0.0 to 300.0 s/100Hz	100.0	16.6	EUR>40.0 USA>33.3	EUR>13.333 USA>11.111
0.04	Deceleration rate 1 {2.21}	0.0 to 300.0 s/100Hz	100.0	16.6	EUR>40.0 USA>33.3	EUR>13.333 USA>11.111
0.20	T7 Analog input 2 destination {7.14}	Pr 0.00 to Pr 50.99	Pr 1.36	Pr 1.36	Pr 1.37	
1.51	Power-up keyboard control mode reference	Reset (0), lasT (1), pRs1 (2)	Last (1)	Last (1)	rRESET (0)	
1.52	Enable hand/off/auto keypad operating mode	0 to 3	Disable (0)	Disable (0)	Off (2)	
2.06	S ramp enable	OFF (0) or On (1)	On (1)	On (1)	Off (0)	
2.07	S ramp acceleration limit	0.0 to 300.0 s/100Hz	60.0	16.6	3.1	1.5
6.12	Enable stop key	OFF (0) or On (1)	On (1)	On (1)	Off (0)	
6.49	Enable Date/Time in trip log	OFF (0) or On (1)	On (1)	On (1)	Off (0)	
7.10	T5/6 Analog input destination	Pr 0.00 to Pr 50.99	Pr 0.00	Pr 0.00	Pr 1.36	
9.04	Logic Function Source 1	Pr 0.00 to Pr 50.99	Pr 8.03	Pr 8.03	Pr 0.00	
9.06	Logic Function Source 2	Pr 0.00 to Pr 50.99	Pr 8.06	Pr 8.06	Pr 0.00	
9.10	Logic Function 1 destination	Pr 0.00 to Pr 50.99	Pr 1.43	Pr 1.43	Pr 0.00	

NOTE

The actual acceleration/deceleration times are for a 100 Hz speed reference. For 50Hz, these settings must be divided by 0.5 and for 60 Hz these settings must be divided by 0.6. For example, for a 10 second acceleration relevant to a 60Hz frequency reference, the acceleration time must be set as 10/0.6 = 16.6 seconds.



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