



More *Than Just a Motor Company.*

Micro Series
Addendum to the
Installation and Operation Manual

The Micro Series drive now offers model numbers and programmability not covered in the Users Manual M106P:

1. The power range has been expanded from that described in M106P, specifically:

200/240 Vac models

174576.00	40 Hp, NEMA 1
174577.00	40 Hp, NEMA 12
174578.00	60 Hp, NEMA 1
174579.00	60 Hp, NEMA 12

400/480 Vac models

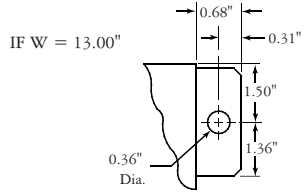
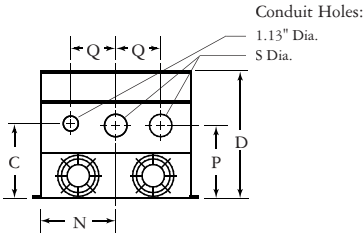
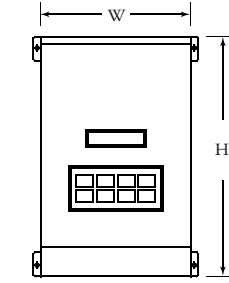
174580.00	75 Hp, NEMA 1
174581.00	75 Hp, NEMA 12
174582.00	100 Hp, NEMA 1
174583.00	100 Hp, NEMA 12
174584.00	125 Hp, NEMA 1
174585.00	125 Hp, NEMA 12
174586.00	150 Hp, NEMA 1

2. PID Setpoint Control has been added as a standard feature.

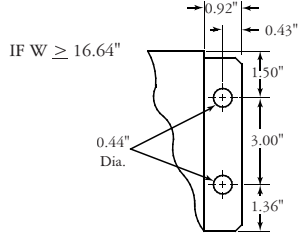
- Parameters 55 and 70-82 have been added for PID functionality.
- Parameters 69 and 70 have been changed to Parameters 98 and 99 respectively.
- Parameters 26, 31, 52, 53 and 54 have new selections available.
- Parameters 8, 9 and 19 have new ranges for the new power ratings

These changes will be reflected in the next printing of the manual.

DIMENSIONS - NEMA 1

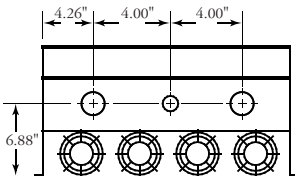


Mounting Tab Detail



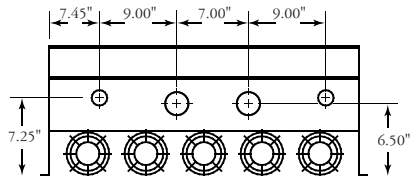
INPUT											
HP/kW	VOLTAGE	MODEL	H	W	D	N	C	P	Q	S	
40/30	240 / 200	174576.00	25.00	13.00	10.50	5.56	6.50	6.50	2.62	1.38	
60/45	240 / 200	174578.00	47.00	16.64	11.85			See below			
75/55	480 / 400	174580.00	29.00	16.64	11.85	7.14	6.88	6.88	3.12	1.75	
100/75	480 / 400	174582.00	29.00	24.42	11.85	11.12	7.25	6.50	4.50	2.50	
125/90	480 / 400	174584.00	29.00	24.42	11.85	11.12	7.25	6.50	4.50	2.50	
150/110	480 / 400	174586.00	29.00	36.66	11.85			See below			

CONDUIT HOLES FOR 174578.00



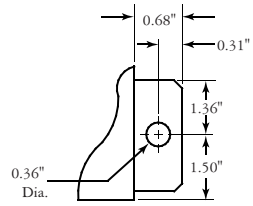
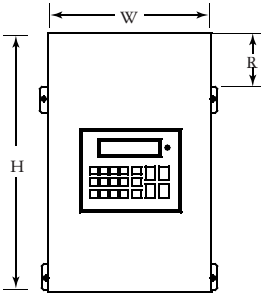
Conduit Holes: Large holes = 1.75"
Small hole = 1.13"

CONDUIT HOLES FOR 174586.00



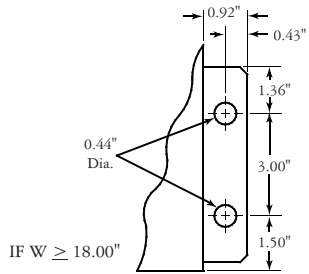
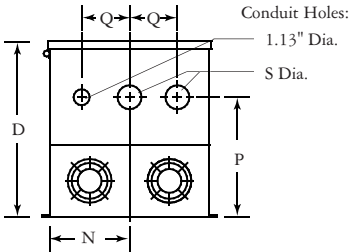
Conduit Holes: Large holes = 3.00"
Small holes = 1.13"

DIMENSIONS - NEMA 12



IF W = 14.00"

Mounting Tab Detail



IF W ≥ 18.00"

INPUT											
HP/kW	VOLTAGE	MODEL	H	W	D	N	P	Q	R	S	
40/30	240 / 200	174577.00	31.00	14.00	11.86	6.00	7.50	2.62	5.64	1.38	
60/45	240 / 200	174579.00	49.00	18.00	13.30	7.50	8.00	3.13	7.14	1.75	
75/55	480 / 400	174581.00	37.00	18.00	13.30	7.50	8.00	3.13	7.14	1.75	
100/75	480 / 400	174583.00	39.00	26.00	13.30	11.50	9.00	4.50	9.14	2.50	
125/90	480 / 400	174585.00	39.00	26.00	13.30	11.50	9.00	4.50	9.14	2.50	

RATINGS

MODEL			INPUT			OUTPUT	
MODEL NUMBER	FOR MOTORS		INPUT PHASE	NOMINAL CURRENT (AMPS)	POWER (KVA)	NOMINAL CURRENT (AMPS)	POWER (KVA)
	RATED						
	HP	kW					
174576.00 174577.00	40	30	3	119 / 99	41.0	120 / 104	41.4
174578.00 174579.00	60	45	3	174 / 145	60.5	177 / 154	61.3
174580.00 174581.00	75	55	3	109 / 91	75.5	110 / 96	76.5
174582.00 174583.00	100	75	3	139 / 116	96.4	143 / 124	98.8
174584.00 174585.00	125	90	3	175 / 146	121.4	179 / 156	124.3
174586.00	150	110	3	202 / 168	139.7	207 / 180	143.4

MISCELLANEOUS INFO

SPACING REQUIREMENTS FOR COOLING

In addition to the spacing requirements shown in Section 7.0 of the Users Manual, the table below defines the spacing requirements for 75 - 150 HP.

SPACING REQUIREMENTS		
HP	SPACING	
	INCHES	mm
75 - 150	8	200

ADDITIONAL FORM C RELAY

Models rated above 30 Hp at 200/240 Vac and 60 Hp at 400/480 Vac have a second Form C relay at terminals TB-19, TB-20, and TB-21. This relay is controlled by Parameter 52 - TB14 OUT.

PARAMETER MENU - CHANGES

PARAMETER MENU			
PARAM. NUMBER	PARAMETER NAME	RANGE OF ADJUSTMENT	FACTORY DEFAULT
26	STOP	COAST, RAMP, RAMP2	COAST
31	UNITS	sp: HERTZ, RPM, % HZ, /SEC, /MIN, /HR, GPH, NONE pid: %, PSI, FPM, CFM, GPM, IN, FT, /SEC, /MIN, /HR, F, C, MPM, GPH	sp: HERTZ
52 53 54	TB14 OUT TB15 OUT RELAY	NONE, RUN, FAULT, /FAULT, LOCK, @ SPEED, ABOVE #3, I LIMIT, AUT/MAN, FLWR PR, MIN/MAX ALARM, INV MIN/MAX A, MIN ALARM, INV MIN ALARM, MAX ALARM, INV MAX ALARM, REVERSE, SLEEP, SPD = 0HZ	NONE
55	TB5B LOSS	FAULT, SP#4, NONE	FAULT
69	This parameter will not be shown, Parameters 69 and 70 are now 98 and 99		
70	PID MODE	OFF, NORMAL, REVERSE	OFF
74	PID FB	TB-5A, TB-5B	TB-5A
75	FB @ MIN	-32768 to 32767	0.0 %
76	FB @ MAX	-32768 to 32767	100.0 %
77	P GAIN	0.0 - 999.9 %	5.0 %
78	I GAIN	0.0 - 10.0 SEC	0.0 SEC
79	D GAIN	0.0 - 10.0 SEC	0.0 SEC
80	PID ACC	0.0 - 100.0 SEC	30.0 SEC
81	MIN ALRM	FB @ MIN - FB @ MAX	0.0 %
82	MAX ALRM	FB @ MIN - FB @ MAX	0.0 %
98	LANGUAGE		ENGLISH
99	FAULT HISTORY	(VIEW - ONLY)	(N/A)

DESCRIPTION OF PARAMETERS - CHANGES

8 **ACCEL** (ACCELERATION TIME)

For the new models, the range of adjustment is 1.0 - 3600 SEC

9 **DECEL** (DECELERATION TIME)

The table below contains the data for the new models:

DECELERATION LIMITS			
HORSEPOWER / VOLTAGE RATING		RANGE OF ADJUSTMENT	
240 / 200 Vac	480 / 400 Vac	WITHOUT DB	WITH DB
40 HP	----	1.0 - 3600 SEC	0.3 - 3600 SEC
60 HP	75 HP	3.0 - 3600 SEC	0.8 - 3600 SEC
----	100 - 150 HP	7.0 - 3600 SEC	1.8 - 3600 SEC

19 **FX BOOST** (FIXED BOOST)

The factory default for FX BOOST depends on the horsepower rating. Refer to the table below:

FX BOOST FACTORY DEFAULT SETTINGS		
HORSEPOWER / VOLTAGE RATING		RANGE OF ADJUSTMENT
240 / 200 Vac	480 / 400 Vac	
40 HP	----	2.3 %
60 HP	----	2.1 %
----	75	2.0 %
----	100 - 125	1.9 %
----	150	1.8 %

26 **STOP** (STOP MODE)

This parameter selects whether the motor will COAST to a stop, or RAMP to a stop, when the drive is given a stop command.

COAST When a stop command is given, the drive shuts off the output to the motor, allowing it to coast to a stop. The time required for the motor to stop is governed by the inertia of the load.

RAMP When a stop command is given, the drive will decelerate the motor to a stop over a period of time according to Parameter 9 - DECEL. Once the output frequency reaches 0.0 Hz, there will be a 200 ms delay before the drive can be started again.

RAMP2 Same as RAMP, but without the 200 ms start delay. This allows faster start/stop cycles for applications that require it.

31 **UNITS** (SPEED/PID UNITS)

UNITS sets the units of the output speed or PID display on the keypad. The following choices are available:

- Speed mode: HERTZ, RPM, %HZ, /SEC, /MIN, /HR, GPH, NONE
PID mode: %, PSI, FPM, CFM, GPM, IN, FT, /SEC, /MIN, /HR, F, C,
 MPM, GPH

NOTE: If one of the "pid" units is selected, but the drive is in Manual (open-loop) speed control mode or PID MODE is DISABLED, the displayed speed units will default to HERTZ. If one of the "speed" units is selected, but PID MODE is ENABLED and the drive is in Auto mode, the displayed PID units will default to %.

- 52 **TB14 OUT** (TB-14 OPEN COLLECTOR OUTPUT)
53 **TB15 OUT** (TB-15 OPEN COLLECTOR OUTPUT)
54 **RELAY** (RELAY FUNCTION)

Additional settings:

- MIN/MAX ALARM** The relay energizes when the feedback signal (in PID mode) or the speed reference signal (in open-loop speed mode) is within the limits set by MIN ALARM and MAX ALARM (Parameters 81 and 82), and de-energizes when the signal falls below the MIN ALARM setting or exceeds the MAX ALARM setting.
- INV MIN/MAX A** INVERSE MIN/MAX ALARM - The relay de-energizes when the feedback signal (in PID mode) or the speed reference signal (in open-loop speed mode) is within the limits set by MIN ALARM and MAX ALARM (Parameters 81 and 82), and energizes when the signal falls below the MIN ALARM setting or exceeds the MAX ALARM setting.
- MIN ALARM** The relay de-energizes when the feedback signal (in PID mode) or the speed reference signal (in open-loop speed mode) equals or exceeds the MIN ALARM setting (Parameter 81), and energizes when the signal falls below the MIN ALARM setting.
- INV MIN ALARM** INVERSE MIN ALARM - The relay energizes when the feedback signal (in PID mode) or the speed reference signal (in open-loop speed mode) equals or exceeds the MIN ALARM setting (Parameter 81), and de-energizes when the signal falls below the MIN ALARM setting.
- MAX ALARM** The relay de-energizes when the feedback signal (in PID mode) or the speed reference signal (in open-loop speed mode) is less than or equal to the MAX ALARM setting (Parameter 82), and energizes when the signal exceeds the MAX ALARM setting.
- INV MAX ALARM** INVERSE MAX ALARM - The relay energizes when the feedback signal (in PID mode) or the speed reference signal (in open-loop speed mode) is less than or equal to the MAX ALARM setting (Parameter 82), and de-energizes when the signal exceeds the MAX ALARM setting.
- SLEEP** The relay energizes when the drive is in SLEEP MODE. See parameters 36 - 38.

SPD = 0HZ The relay energizes when there is no output to the motor, for any reason, such as: drive is in STOP mode, drive is in RUN mode but the speed command is 0 Hz, drive is in SLEEP mode, drive has tripped into a fault, etc.

NOTE: Models above 30 Hp at 200/240 Vac and 60 Hp at 400/480 Vac have a second relay at terminals TB-19, TB-20, and TB-21. This relay is controlled by Parameter 52 - TB14 OUT.

55 **TB5B LOSS** (LOSS OF FOLLOWER ACTION)

This parameter selects the action taken by the drive if the follower signal is lost at TB-5B. This function is only active if the follower signal is 4-20 mA. The signal is considered lost if it falls below 2 mA.

FAULT The drive will trip into a FOLLOWER fault condition.

SP #4 The drive will go to SPEED #4 (Parameter 4).

NONE The drive will go to the programmed minimum speed.

70 **PID MODE** (PID MODE SELECT)

This parameter activates the PID function, and selects whether the PID control will be direct or reverse acting. Refer to Section 19.0 - MICRO PID SETPOINT CONTROL. The following options are available:

OFF Disables the PID function to allow "standard" drive operation.

NORMAL Enables the PID function for direct acting systems. An increase in the feedback variable will cause a decrease in motor speed.

REVERSE Enables the PID function for reverse acting systems. An increase in the feedback variable will cause an increase in motor speed.

NOTE: The REVERSE selection is not used to compensate for reverse acting feedback devices. If a reverse acting feedback device is used, program Parameters 75 and 76 - FB @ MIN and FB @ MAX as described in Section 19.1 - FEEDBACK DEVICES.

When PID is enabled, and the drive is in REMOTE and AUTO mode, the drive will operate in a CLOSED LOOP fashion, responding to the feedback signal in order to maintain the process setpoint. In this case, the setpoint reference can be a 0-10 VDC or 4-20 mA signal, or the keypad. The SPEED REFERENCE SOURCE indication in the CONTROL display will indicate VDC (0-10 VDC), IDC (4-20 mA), or AKB (keypad), depending on the setpoint reference.

When PID is enabled, and the drive is in LOCAL and AUTO mode, the drive will also operate in a CLOSED LOOP fashion. However, in this case, the only setpoint reference available is the keypad, and the SPEED REFERENCE SOURCE indication in the CONTROL display will indicate AKB.

When PID is enabled, and the drive is in MANUAL and LOCAL or REMOTE mode, the drive will operate in an OPEN LOOP fashion, responding directly to speed commands from the keypad only. The SPEED REFERENCE SOURCE indication in the CONTROL display will indicate MKB.

When PID is disabled, the drive will operate in an OPEN LOOP mode, responding directly to speed commands from either the keypad (MANUAL mode) or an analog input signal or preset speed (AUTO mode).

74 **PID FB** (PID FEEDBACK SOURCE)

This parameter selects the terminal to be used for the feedback signal, and can be set to TB-5A or TB-5B. TB-5A is used for 0-10 VDC signals, and TB-5B is used for 4-20 mA signals.

NOTE: The Micro has only one analog input of each type, so the same type of signal cannot be used for feedback and setpoint reference. For example, a 4-20 mA signal from a transducer could not be used as a feedback signal if the setpoint is being controlled by a 4-20 mA signal from a PLC.

75 **FB @ MIN** (MINIMUM FEEDBACK VALUE)

This parameter should be set to the value of the process variable that corresponds to the minimum transducer feedback signal (0 VDC or 4 mA).

76 **FB @ MAX** (MAXIMUM FEEDBACK VALUE)

This parameter should be set to the value of the process variable that corresponds to the maximum transducer feedback signal (10 VDC or 20 mA).

NOTE: If a reverse acting feedback device is being used, FB @ MIN should be set to the maximum process variable value, and FB @ MAX should be set to the minimum process variable value.

77 **P GAIN** (PROPORTIONAL GAIN)

This parameter setting represents the speed command output (in % of maximum speed) that results from each 1% of error (1% of the feedback range; FB @ MAX minus FB @ MIN).

Example: If P GAIN is programmed for 5%, and the error (difference between setpoint and feedback) is 10%, the speed command output of the Proportional term is 50% ($10 \times 5 = 50$) of maximum speed.

78 **I GAIN** (INTEGRAL GAIN)

This parameter setting represents the ramp rate of the speed command output (in % of maximum speed per second) that results from each 1% of error.

Example: If I GAIN is programmed for 0.5 seconds, and the error is 5%, the rate of rise of the speed command output of the Integral term is 2.5% ($0.5 \times 5 = 2.5$) of maximum speed per second.

79 **D GAIN** (DIFFERENTIAL GAIN)

This parameter setting represents the speed command output (in % of maximum speed) that results from each 1% per second change in the error.

Example: If D GAIN is programmed for 5 seconds, and the error is increasing at 2% per second, the speed command output of the Differential term is 10% ($5 \times 2 = 10$) of maximum speed.

NOTE: Differential gain is used as a "shock-absorber" to dampen overshoots in fast-acting systems. However, it can be very sensitive to "noise" on the feedback signal and to digitizing errors, so it must be used with caution.

80 **PID ACC** (PID ACCEL/DECEL)

This parameter sets the acceleration and deceleration rate of the setpoint reference into the PID unit. When the setpoint changes, this function will “filter” the input to the PID unit by ramping the setpoint reference from the previous value to the new value. This will help prevent overshoots that can occur when the PID control attempts to respond to step changes in setpoint, resulting in smoother operation. If PID ACC is set to 0.0 seconds, it is effectively disabled.

81 **MIN ALRM** (PID MINIMUM ALARM)

This parameter setting represents the value that the feedback signal (in PID mode) or speed reference signal (in open-loop speed mode) must fall below to activate the MIN ALARM output (see Parameters 52, 53, and 54).

82 **MAX ALRM** (PID MAXIMUM ALARM)

This parameter setting represents the value that the feedback signal (in PID mode) or speed reference signal (in open-loop speed mode) must exceed to activate the MAX ALARM output (see Parameters 52, 53, and 54).

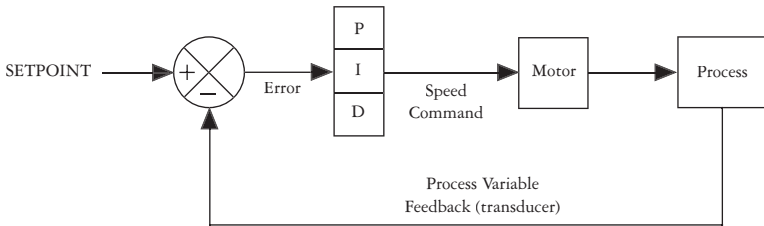
NOTE 1: The MIN/MAX ALARM function can be used to start and stop the drive based on the level of the speed reference signal or PID feedback signal. This is done by wiring a 2-wire start/stop circuit through the drive's Form C relay or open-collector output, and setting the Form C relay or open-collector output for MIN/MAX (see Parameters 52, 53, and 54). When the signal drops below the MIN ALARM setting, the relay or open-collector output will de-energize, which opens the start contact and stops the drive. When the signal is equal to or greater than the MIN ALARM setting, the relay or open-collector output will energize, which closes the start contact and starts the drive. The drive must be in REMOTE mode to use the MIN/MAX function to start and stop the drive.

NOTE 2: When using the MIN and MAX ALARM functions in open-loop speed mode (PID is disabled), parameter 74 - PID FB must still be set to match the speed reference signal being used.

MICRO PID SETPOINT CONTROL

PID Setpoint Control allows the Micro to maintain a process setpoint, such as PSI or CFM, without using an external controller. When PID is activated, the Micro will operate in a closed-loop fashion, automatically adjusting the motor speed to maintain the setpoint.

PID setpoint control requires feedback from the process in order to compare the process variable "value" to the setpoint. The difference between the process variable "value" and the setpoint is called the error. The Micro will increase or decrease the motor speed in an attempt to minimize the error. By constantly adjusting the motor speed, the PID control will drive the process toward the setpoint. Refer to the PID block diagram below:



19.1 FEEDBACK DEVICES

A transducer or transmitter is required to monitor the process variable and provide feedback to the PID unit in order to compare the process variable feedback to the setpoint. A transducer outputs a signal corresponding to a fixed range of the process variable. A transmitter provides offset and gain adjustments to allow the output signal to be adjusted to correspond to different ranges of the process variable. Typical output signals for transducers and transmitters are: 0-5 VDC, 0-10 VDC, or 4-20 mA. The feedback device must be externally powered, as the drive does not have a power supply for such devices. Program Parameter 74 - PID FB (PID FEEDBACK SOURCE) for the appropriate terminal (TB-5A or TB-5B), and connect the feedback device as described below:

POT The positive signal wire (wiper) is connected to TB-5A, and the "high" lead is connected to TB-6.

0-5, 0-10 VDC Connect the positive signal wire to TB-5A.

4-20 mA Connect the positive signal wire to TB-5B.

The common, or negative signal wire, is connected to TB-2 (circuit common).

Feedback devices can be direct or reverse acting. A direct acting device outputs a signal that increases as the process variable increases. A reverse acting device outputs a signal that decreases as the process variable increases. The programming of Parameters 75 - FB @ MIN and 76 - FB @ MAX depend on the type of feedback device being used.

When using a direct acting transducer, Parameter 75 - FB @ MIN should be set to the value of the process variable feedback corresponding to the minimum feedback signal (0 VDC or 4 mA), and Parameter 76 - FB @ MAX should be set to the value of the process variable feedback corresponding to the maximum feedback signal (5 or 10 VDC, or 20 mA).

Example 1: A 0-100 psi transducer outputs a 4 mA signal at 0 psi and 20 mA at 100 psi. Program Parameter 75 to 0.0 PSI, and Parameter 76 to 100.0 PSI (This assumes that Parameter 31 - UNITS is set to pid PSI, and Parameter 33 - UNITS DP is set to XXX.X).

For a reverse acting transducer, set Parameter 75 - FB @ MIN to the maximum process variable feedback value, and set Parameter 76 - FB @ MAX to the minimum process variable feedback value. In other words, Parameter 75 is set higher than Parameter 76. See the example below:

Example 2: A 0-100 psi transducer outputs a 20 mA signal at 0 psi and 4 mA at 100 psi. Program Parameter 75 to 100.0 PSI, and Parameter 76 to 0.0 PSI (This assumes that Parameter 31 - UNITS is set to pid PSI, and Parameter 33 - UNITS DP is set to XXX.X).

19.2 THE SYSTEM - DIRECT AND REVERSE ACTING

The entire system can also be direct or reverse acting. In a direct acting system, an increase in motor speed causes an increase in the process variable. This is equivalent to requiring an increase in motor speed in response to a decreasing process variable feedback.

In a reverse acting system, an increase in motor speed causes a decrease in the process variable. This is equivalent to requiring an increase in motor speed in response to an increasing process variable feedback. Examples of direct and reverse acting systems are described in the next section.

19.3 PID CONTROL - DIRECT AND REVERSE ACTING

The PID Setpoint Control software can be direct or reverse acting, and must be set to match the system. This is accomplished with Parameter 70 - PID MODE. When set to NORMAL (for direct acting systems), the PID unit will command an increase in motor speed if the process variable feedback decreases, and a decrease in motor speed if the process variable feedback increases. When set to REVERSE (for reverse acting systems), the opposite is true.

NOTE: The REVERSE setting for Parameter 70 - PID MODE is **not** used to compensate for reverse acting feedback devices. If a reverse acting feedback device is used, program Parameters 75 and 76 as described above.

An example of a direct acting system is one that maintains duct pressure. Duct pressure is the process variable that is monitored by the feedback device. As duct pressure rises, motor speed needs to be decreased to maintain the pressure. A direct acting PID control will command a decrease in motor speed in response to an increasing process variable feedback.

An example of a reverse acting system is one that maintains water temperature in a cooling tower. Water temperature is the process variable that is monitored by the feedback device. As the water temperature rises, motor speed needs to be increased to lower the temperature of the water. A reverse acting PID control will command an increase in motor speed in response to an increasing process variable feedback.

19.4 SETPOINT REFERENCE SOURCES

The setpoint reference input can be one of the following:

1. Keypad
2. 4-20 mA signal at TB-5B
3. 0-10 VDC signal at TB-5A
4. Potentiometer signal at TB-5A

In order to use TB-5A or TB-5B for a setpoint input, one of the TB-13 terminals must be programmed for the appropriate signal. Closing the TB-13 terminal to TB-2 will then select that signal as the setpoint reference. If the contact closure is not made to TB-2, the setpoint reference source will default to the keypad. See Parameters 47 - TB13A, 48 - TB13B, and 49 - TB13C.

Remote setpoint reference inputs at TB-5A and TB-5B can only be used if that terminal is NOT being used for the process feedback signal from a transducer. The Micro has only one analog input of each type, so the same type of signal cannot be used for transducer feedback and setpoint reference. For example, a 4-20 mA signal from a transducer could not be used as a feedback signal if the setpoint is being controlled by a 4-20 mA signal from a PLC.

19.5 TUNING THE PID CONTROL

Once the PID control is set up correctly, it needs to be tuned in order to maintain the process setpoint. First, set the Integral and Differential Gains to zero, and increase the Proportional Gain (Parameter 77) until the system becomes unstable, then lower the gain until the system stabilizes again. Set the Proportional Gain about 15% less than that value that stabilizes the system. If only Proportional Gain is used, and the system is operating in a steady-state condition (setpoint is fixed and process variable has settled to a fixed value), there will always be a certain amount of error in the system. This is called the steady-state error.

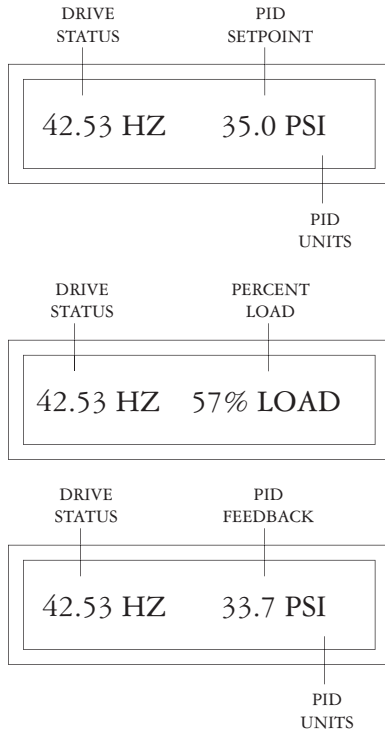
Integral Gain (Parameter 78) is used to force the steady-state error to zero by increasing the output speed command with respect to time. Over time, the error will be forced to zero because the Integral term will continue to change the speed command, even after the Proportional term reaches steady state and no longer affects the speed command. The Integral Gain affects the rate of rise of the output speed command from the Integral term. Small amounts of Integral Gain can cause large changes in PID performance, so care must be taken when adjusting Integral Gain. Too much Integral Gain will result in overshoots, especially if large step changes in error occur.

Typically, Proportional and Integral Gain are all that is needed to fine-tune the system. However, it may be necessary to use Differential Gain (Parameter 79) to further stabilize the system, especially when quick responses are required. The Differential term responds to the rate of change of the error, not the actual error itself. Differential Gain acts like a "shock-absorber" to dampen overshoots that can occur when the PID tries to react quickly to changes in error or setpoint. This allows fast PID response, with reduced risk of becoming unstable due to overshoots. The Differential term is very sensitive to electrical noise on the feedback signal and to digitizing errors, so it must be used with caution.

The other parameter setting that affects the response of the PID control is Parameter 80 - PID ACC. This sets the acceleration (and deceleration) rate of the setpoint reference into the PID unit. When the setpoint changes, this function will "filter" the input to the PID unit by ramping the setpoint reference from the previous value to the new value. This will help prevent overshoots that can occur when the PID control attempts to respond to step changes in setpoint, resulting in smoother operation. If PID ACC is set to 0.0 seconds, it is effectively disabled.

19.6 MICRO DISPLAY IN PID MODE

When the drive is in PID mode, the DRIVE STATUS portion of the display will indicate actual output frequency (in Hertz) instead of RUN, and the right side of the display will indicate PID SETPOINT, % LOAD, or PID FEEDBACK. The ENTER key is used to toggle between the different displays. Examples of the possible displays are shown below:



In the examples above, the drive is running at 42.53 Hz to maintain the PID SETPOINT of 35.0 psi. Pressing the ENTER key displays % LOAD, which is 57%. Pressing ENTER again displays the PID FEEDBACK from the process, which is 33.7 psi.

When the PID SETPOINT and PID FEEDBACK displays are entered, the display will flash SETPOINT or FEEDBACK before displaying the value to indicate which display is being viewed.

20.0 TROUBLESHOOTING

With the addition of the PID function, an additional fault has been added:

FAULT MESSAGES		
FAULT	DESCRIPTION	POSSIBLE CAUSES
FOLLOWER	Loss of Follower fault: 4-20 mA signal at TB-5B is below 2 mA.	Parameter 55 - TB5B LOSS is set to FAULT.



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LEESON ELECTRIC

GRAFTON, WISCONSIN 53024-0241 U.S.A.
TEL (262)377-8810 FAX (262)377-9025 www.leeson.com

Service Dept. FAX (262) 377-0090



A REGAL-BELOIT COMPANY

LEESON CANADA

TELEPHONE (905) 670-4770 FAX (905) 670-4378
MISSISSAUGA (TORONTO), ONTARIO L5T 2N7
www.leeson.ca



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