

<b>Title:</b>	<b>V01.06.00 user firmware and V01.09 power firmware release</b>		
<b>Product:</b>	Mentor MP	<b>Issue Date:</b>	5-December-2011
<b>Variant:</b>	N/A	<b>Date Codes:</b>	
<b>Category:</b>	Product changes - Software	<b>Manuals affected:</b>	Yes
<b>Issued By:</b>	P.Slater	<b>Priority:</b>	Normal

## SUMMARY

Changes:-

- Parallel operation (6, 12 and 24 pulse configurations)
- External field flux input
- Armature IR compensation
- Field IR compensation
- Invert speed error
- Brake function
- Improved supply loss operation
- Autotune routine to set field saturation breakpoints
- Improved tacho loss trip above base speed
- Autotune routine improved to detect movement in armature.
- Thermal accumulator reset on power up
- Extra safe bridge changeover slew hold.

## MORE INFORMATION

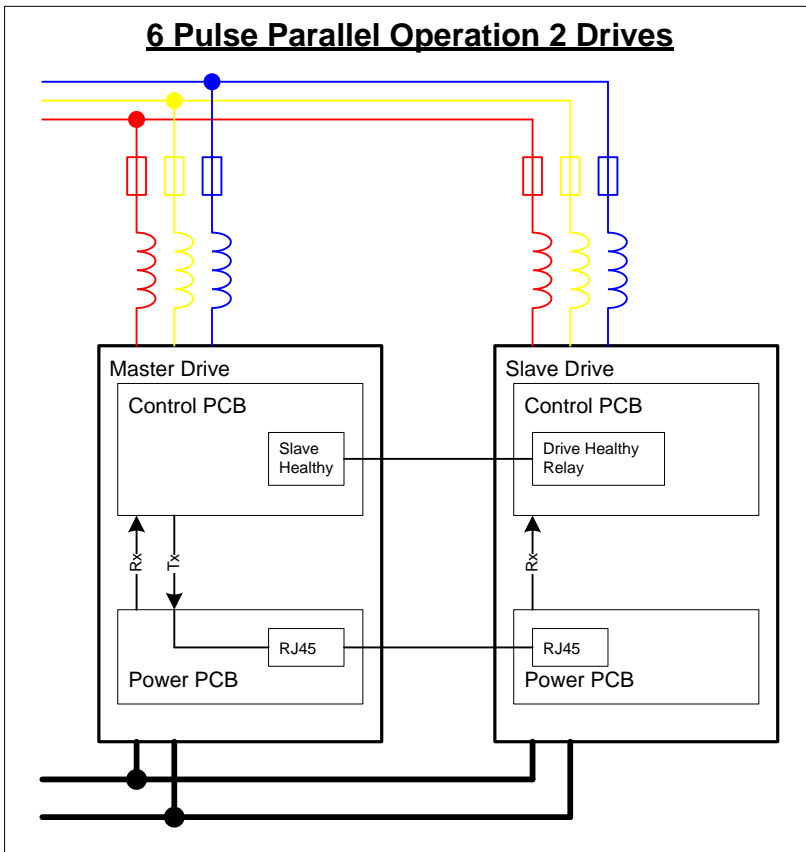
Parallel operation implemented (Parameter 5.43 - Armature Mode)

05.43	Armature mode															
Coding	Bit	SP	FI	DE	TE	VM	DP	ND	RA	NC	NV	PT	US	RW	BU	PS
					1								1	1	1	
Range	0 to 8															
Default	0															
Update rate	Read on reset. Only implemented when drive is inactive.															

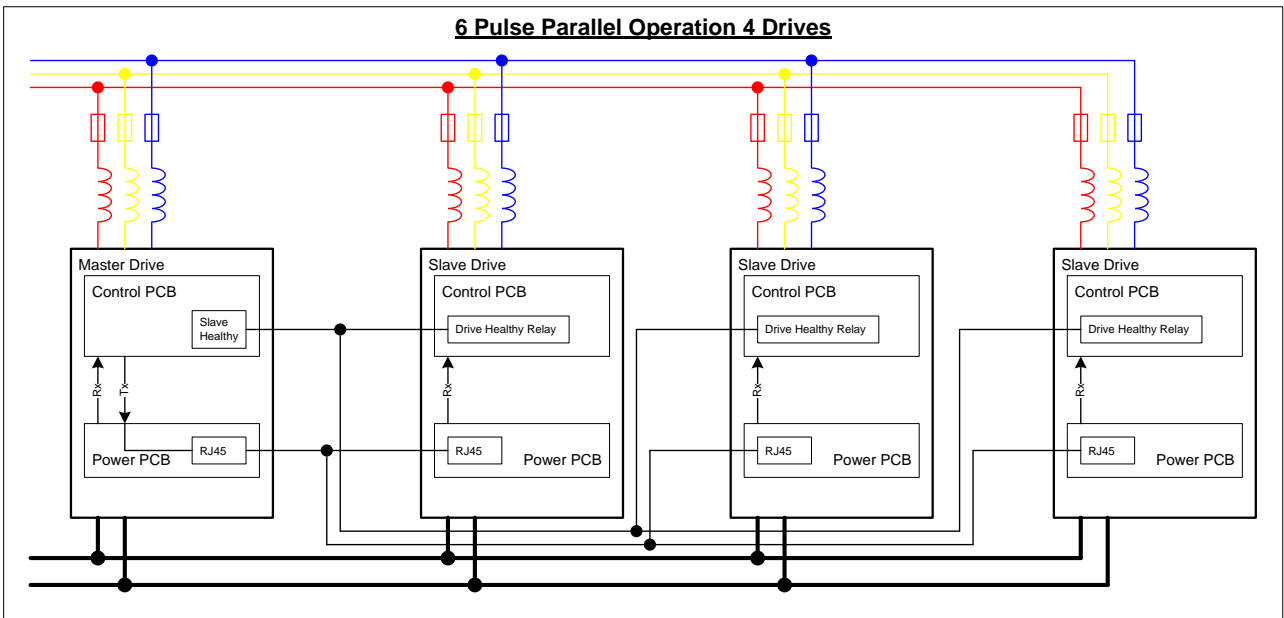
Parameter that contains the nine armature modes

Number	Text	Description
0	Std	Normal (1Q or 4Q)
1	P.1br	Parallel - 1 bridge. Current loop gains reduced by half. No bridge lock out.
2	P.2br12P	Parallel - 2 bridge - 12 pulse
3	P.2br24P	Parallel - 2 bridge - 24 pulse
4	FrEE	Not used
5	FrEE	Not used
6	FrEE	Not used
7	P.cont	Parallel 6P master
8	P.SLAuE	Parallel 6P slave

**Two Drives in 6 Pulse Parallel Operation**



**Four Drives in 6 Pulse Parallel Operation**

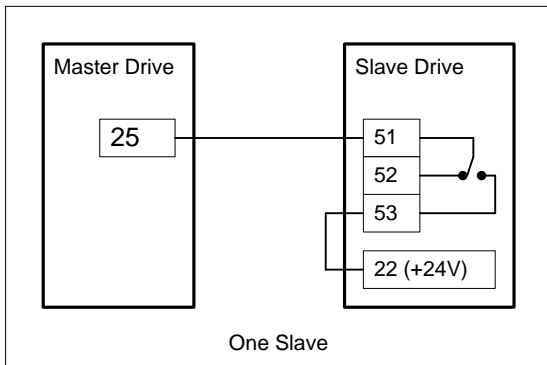


**Master 6 pulse parallel**

**Slave Healthy**

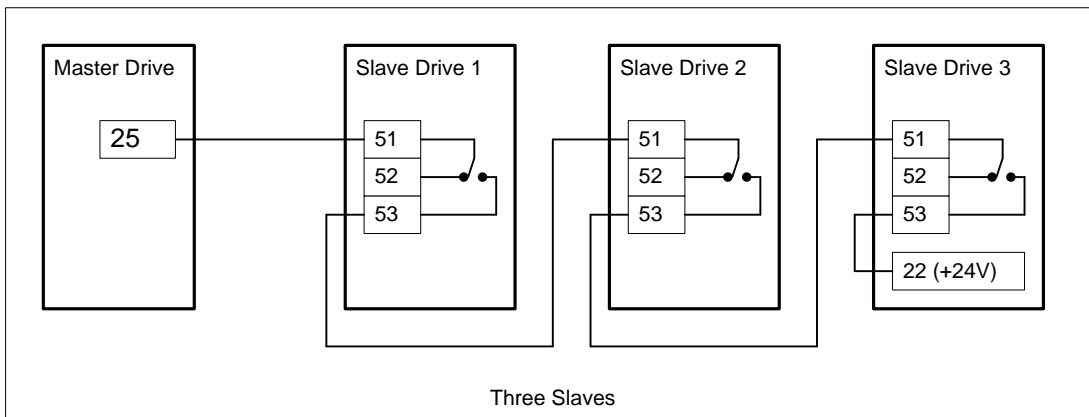
The master drive must know the state of health of the slave or slaves in a 6 pulse parallel system. This can be achieved using digital IO or a communication module. When there are multiply slaves the master can be setup to use 1 bit to check the health of the slave or multiply bits.

**One Slave**

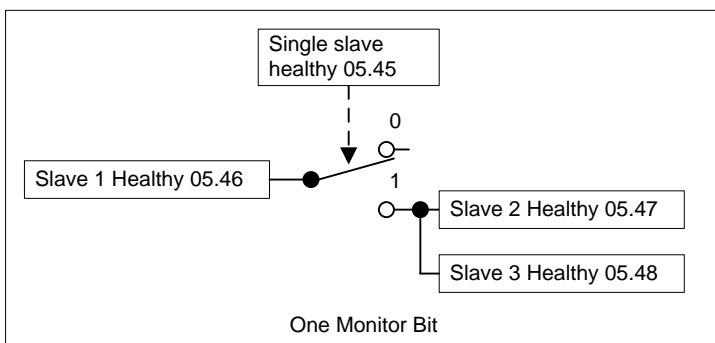


Set 08.22 to 05.45.

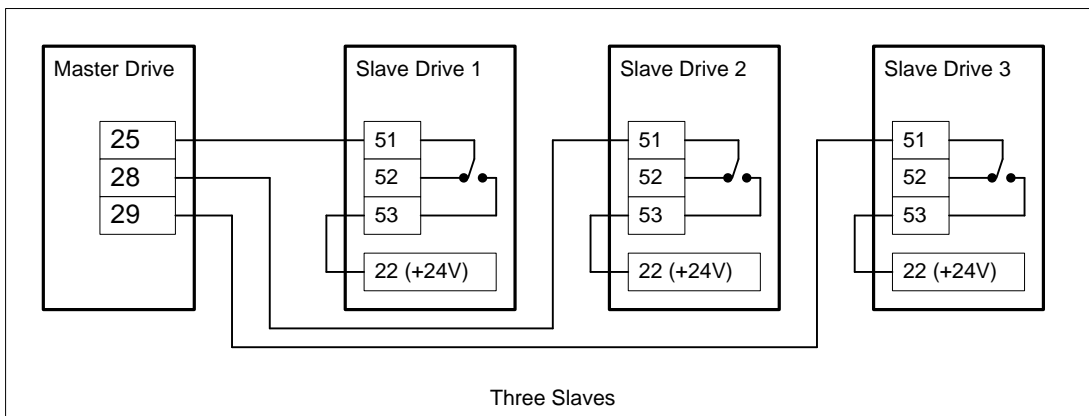
**Multiply Slaves One Monitor Bit**



In this mode 05.45 needs to be set to a 1. Set 08.22 to 05.45.



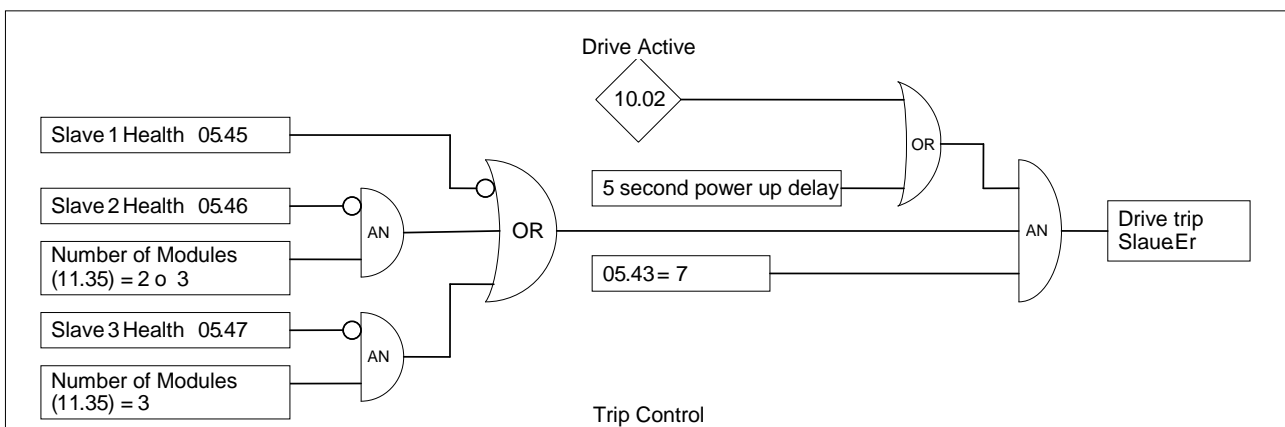
Multiply Slaves Signal Multiply Monitor Bits



Set 08.22 to 05.45, 08.25 to 05.46 and 08.26 to 05.47.

Slave Healthy Bits

The loss of slave healthy will trip the drive. This trip can not masked as the slave trip will be an important trip for example over temperature.



The 5 second power up delay is to allow the whole system to power up before checking that the slaves are healthy. If the system takes longer than 5 seconds to power up DUP could be used to reset the trip. The Drive Active is used to ensure that the slave healthy is checked when the master is given a run command within the 5 second timeout.

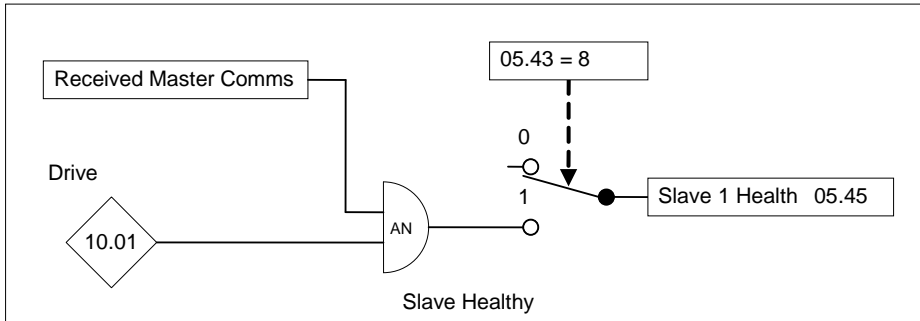
**Set up Sequence**

To configure a drive as the master drive in a 6 pulse parallel system set

- Configure IO dependant on how the slave healthy is to be received.
- Set 05.43 to 7 (P.cont).
- Set 11.35 to the number of slaves in the system.
- Reset the drive.
- 11.32 will now be the number of slaves in the system plus one times the drive rating.

**Slave 6 pulse parallel**

The slave does NOT control its own thyristors so when a slave trips the thyristors are still controlled from the master. The only exception is when the power software generates a hardware fault. In this case the slave power processor will stop firing its own thyristors.



In slave mode the slave healthy is the logical AND of the Received Master Comms and Drive Healthy. Slave healthy can be routed to a relay so the master has an indication of the status of the slave.

**Received Master Comms.**

This bit is set when the drive is in slave mode has received good frames from the master drive. Used to hold the Slave Healthy flag low at power up or mode change. This bit will also go to false if the comms lead between the master and slave is removed.

**Set up Sequence**

If using relay 1 as slave healthy set 08.27 to 05.45. Then set 05.43 to 8. To change a drive from slave mode, set 05.43 to the required new mode, save and then power cycle the drive.

**Parallel 12 and 24 Pulse**

**Parallel 12 Pulse**

To set the drives up in a parallel 12 pulse speed control system they should be programmed so that the master drive is set-up in speed control and the slave drive is programmed in torque control. The final current demand (parameter 04.04) on the master drive has to be fed in to the slave drive torque reference (parameter 04.08). This current demand signal can be transferred between the drives either using an analogue input and output or by communication module or CT Sync.

Additional bridge interlocking signals are shared between the two modules when a four quadrant system is required to ensure that the same bridge on both drives is firing and also that the current has reached zero on both stacks before current reversal is attempted.

**Set up Sequence**

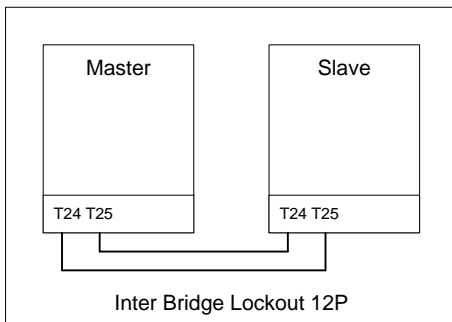
Parallel 12 2Q Using IO Connections

Master Setting	Description	Slave Setting	Description
07.19 = 4.04	Analogue output 1 to output current demand	07.14 = 4.08	Analogue input1 to be torque input
05.43 = 1	Armature mode to	04.11 = 1	Select torque mode

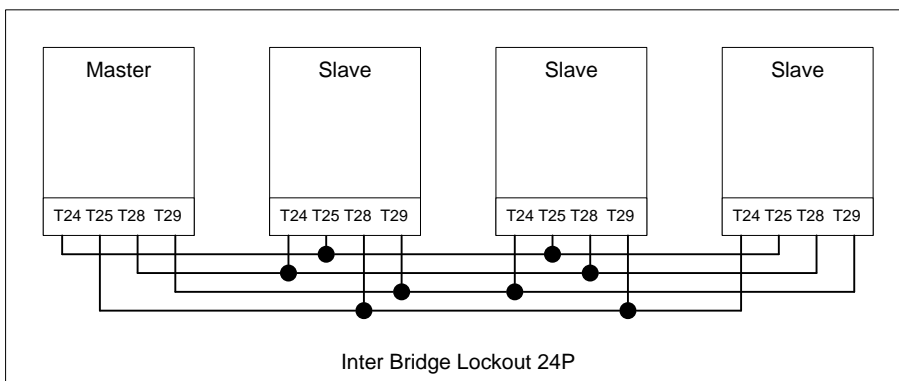
	parallel 12 pulse		
		05.43 = 1	Armature mode to parallel 12 pulse
		10.52 = 168	Mask field loss trip
		10.62 = Off	Mask field loss trip

Parallel 12 4Q Using IO Connections

Master Setting	Description	Slave Setting	Description
07.19 = 4.04	Analogue output 1 to output current demand	07.14 = 4.08	Analogue input1 to be torque input
08.21 = 5.45	Digital output to master bridge selected	08.21 = 5.45	Digital output to master bridge selected
08.22 = 5.46	Digital input 2 to slave bridge selected	08.22 = 5.46	Digital input 2 to slave bridge selected
05.43 = 2	Armature mode to parallel 12 pulse with bridge lockout	04.11 = 1	Select torque mode
		10.52 = 168	Mask field loss trip
		10.62 = Off	Mask field loss trip
		05.43 = 2	Armature mode to parallel 12 pulse with bridge lockout



Master Setting	Description	Slave Setting	Description
07.19 = 4.04	Analogue output 1 to output current demand	07.14 = 4.08	Analogue input1 to be torque input
08.21 = 5.45	Digital output to master bridge selected	08.21 = 5.45	Digital output to master bridge selected
08.22 = 5.46	Digital input 2 to slave 1 bridge selected	08.22 = 5.46	Digital input 2 to slave 1 bridge selected
08.25 = 5.47	Digital input 5 to slave 2 bridge selected	08.25 = 5.47	Digital input 5 to slave 2 bridge selected
08.26 = 5.48	Digital input 6 to slave 3 bridge selected	08.26 = 5.48	Digital input 6 to slave 3 bridge selected
05.43 = 3	Armature mode to parallel 24 pulse with bridge lockout	04.11 = 1	Select torque mode
		10.52 = 168	Mask field loss trip
		10.62 = Off	Mask field loss trip
		05.43 = 3	Armature mode to parallel 24 pulse with bridge lockout



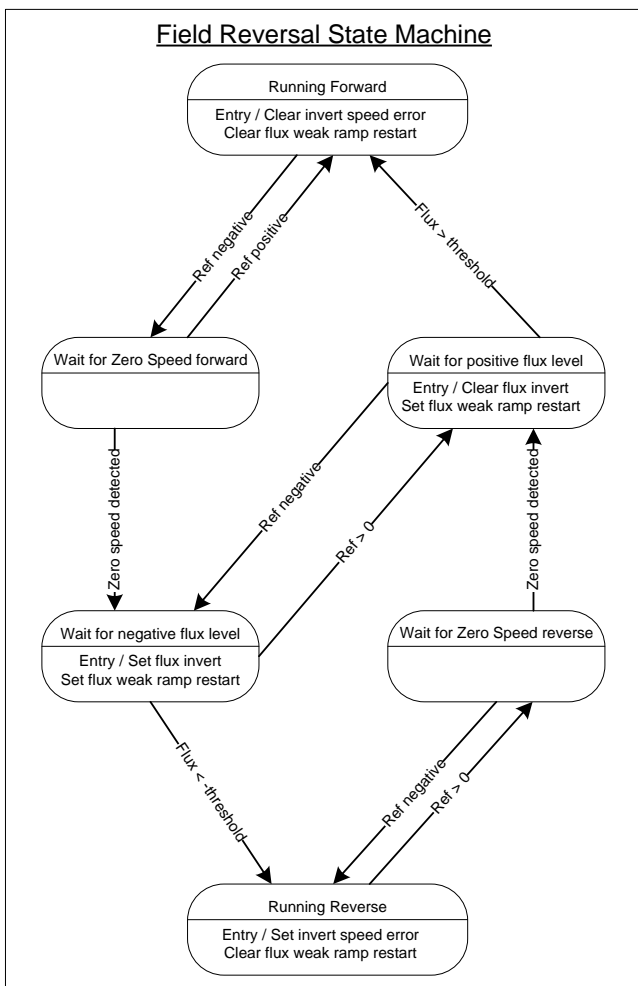
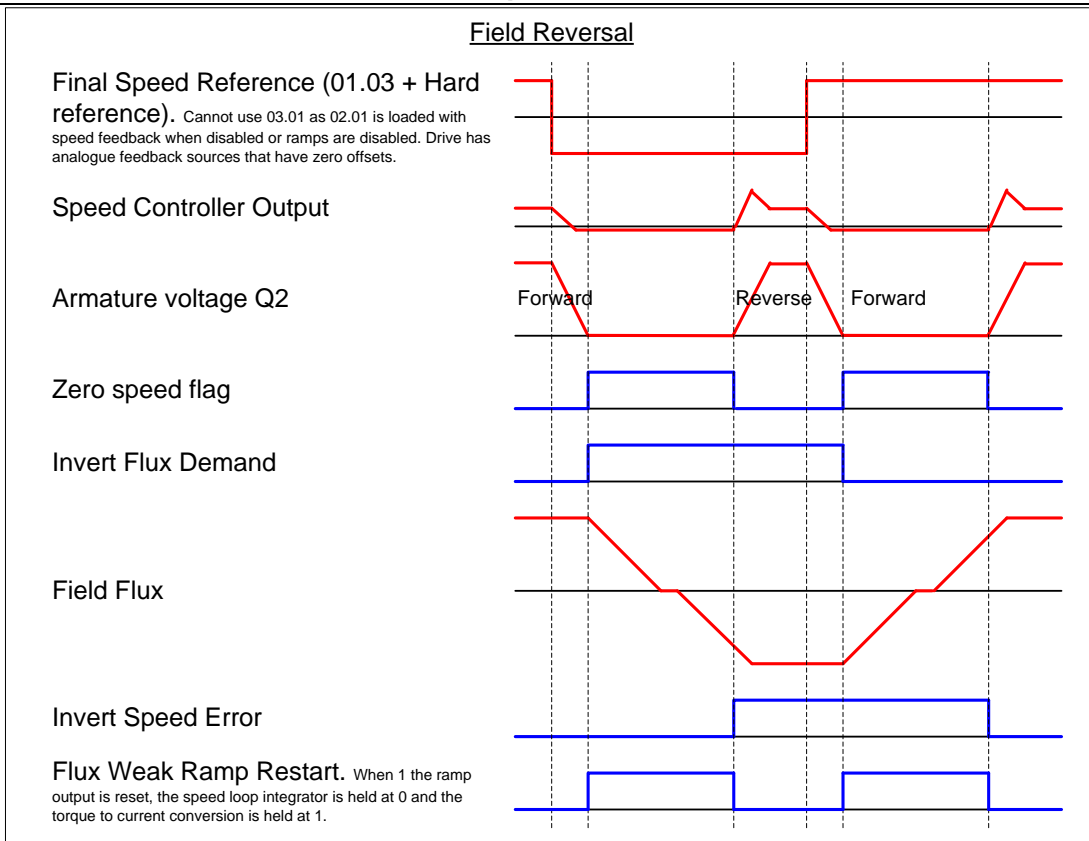
**Auto Tune**

Set 05.12 to 1 only on the master drive. Enable system. When the auto tune has finished transfer the values of 05.15, 04.13, 04.14 and 04.34 from the master to the slave. Start a second auto tune by setting 05.12 to 1 only on the master drive. Enable system. When the auto tune has finished transfer the values of 05.15, 04.13, 04.14 and 04.34 from the master to the slave. The auto tune is now finished.

05.86	Speed Error Invert															
Coding	Bit	SP	FI	DE	TE	VM	DP	ND	RA	NC	NV	PT	US	RW	BU	PS
	1							1		1		1				
Range	0 to 1															
Update rate	Background write															

When this parameter is set the speed error is inverted.





<b>05.87</b>		Field IR Compensation															
Coding	Bit	SP	FI	DE	TE	VM	DP	ND	RA	NC	NV	PT	US	RW	BU	PS	
							1						1	1	1		
Range	0 - 100.0%																
Default	100.0																
Second motor parameter	21.36																
Update rate	1ms read																

This parameter is used to apply compensation for IR voltage drop in the spill over control such that the EMF within the machine is regulated rather than terminal voltage. The default value of 100% provides full compensation. If the user wishes to apply less compensation or none at all, this parameter can be adjusted to the user requirements. If this parameter is adjusted then the set point for the spill over loop (05.59) may need adjusting also to get the required armature voltage on the motor.

<b>05.88</b>		Armature IR Compensation															
Coding	Bit	SP	FI	DE	TE	VM	DP	ND	RA	NC	NV	PT	US	RW	BU	PS	
							1						1	1			
Range	±100.0%																
Default	100.0																
Second motor parameter	21.37																
Update rate	1ms read																

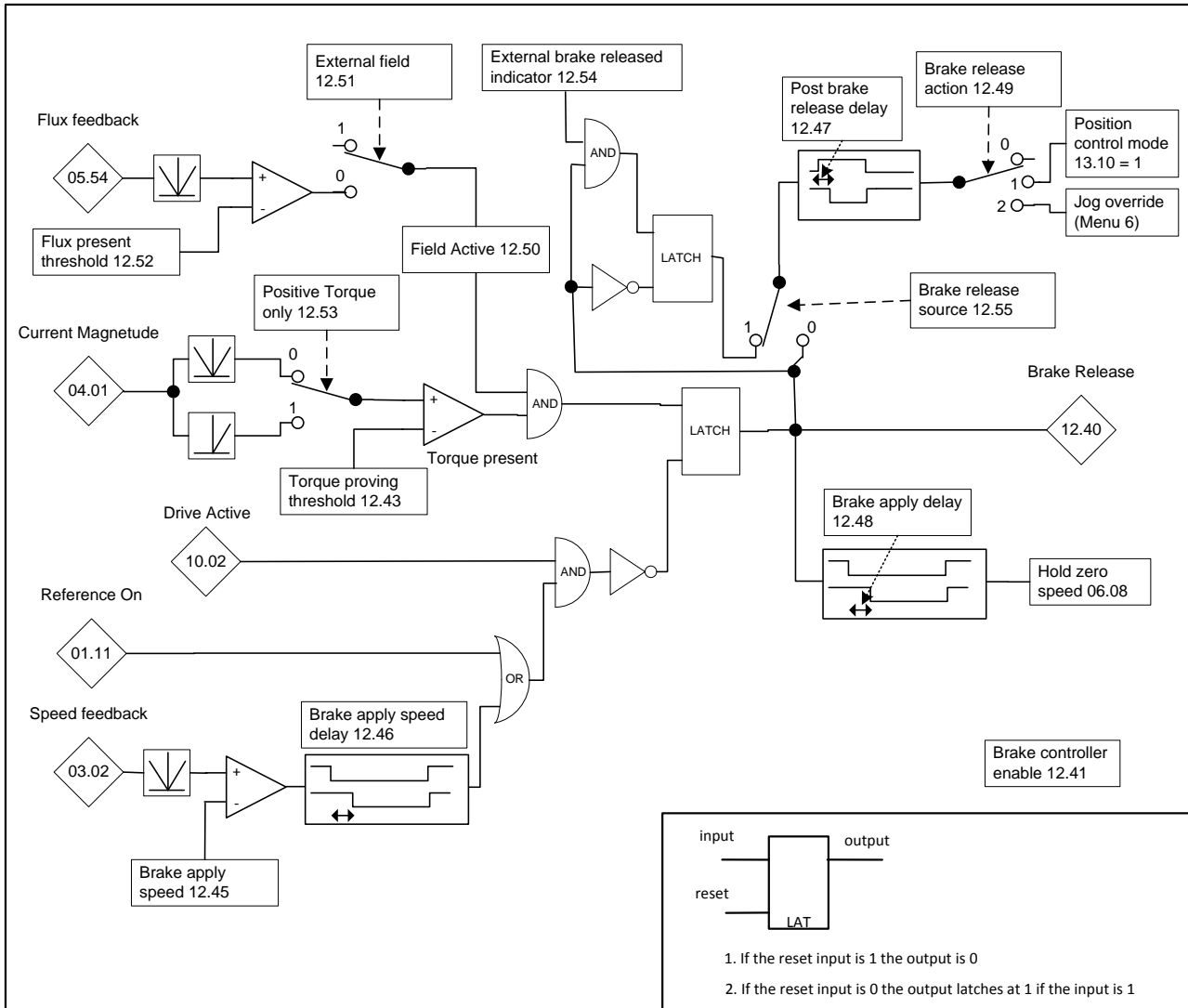
This parameter is used to apply compensation for IR voltage drop in the machine when the drive is being operated in open loop. The default value of 100% provides full compensation. In some motors compensation windings are employed to correct for speed droop under load and so 100% compensation by the controller is not required. In these cases this parameter must be adjusted by the user to apply the correct amount of compensation. Setting a negative value will cause the speed to fall as load increases, implementing the same function as parameter 3.20 (IR droop select) in Mentor II.

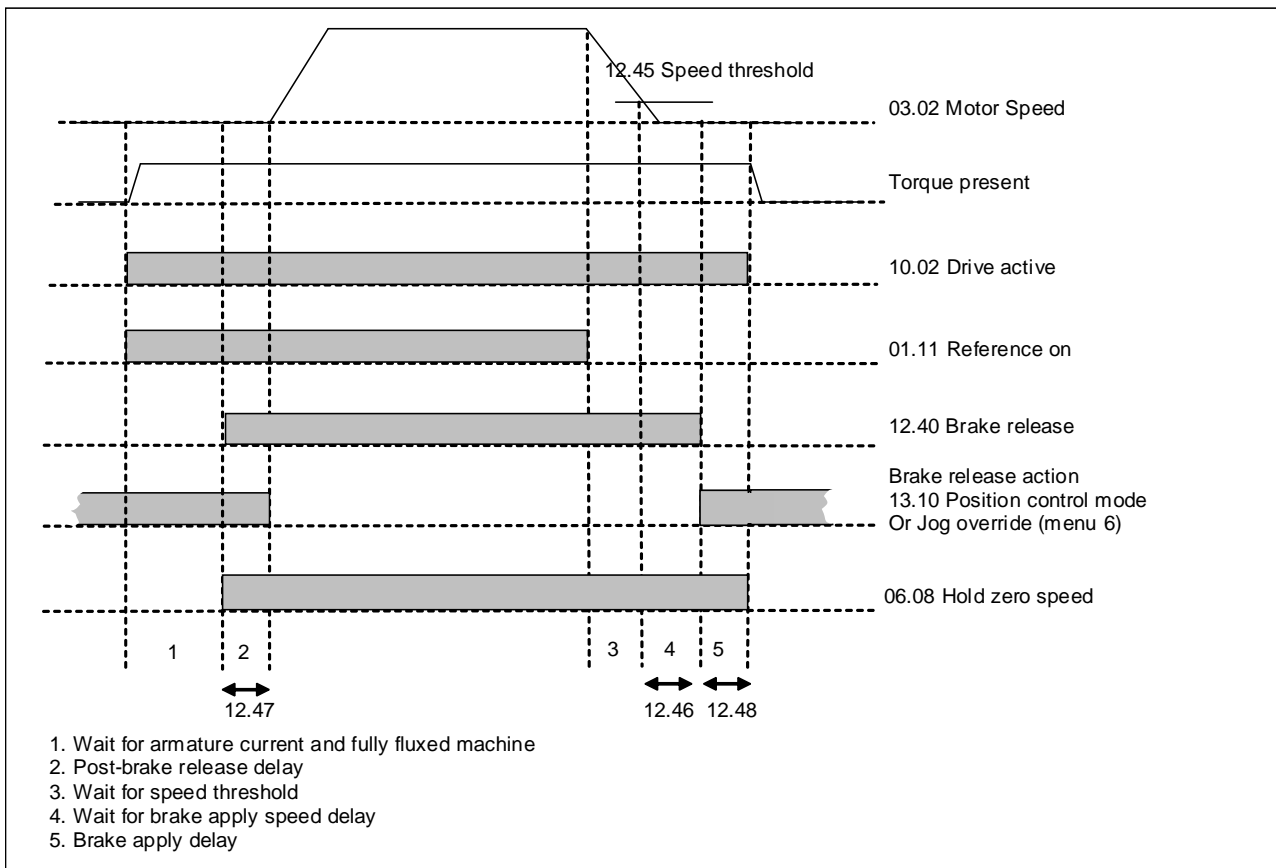
<b>05.89</b>		External Flux feedback															
Coding	Bit	SP	FI	DE	TE	VM	DP	ND	RA	NC	NV	PT	US	RW	BU	PS	
							1	1		1				1	1		
Range	0 to 100.0%																
Update rate	1ms read																

This parameter is provided for users to be able to import feedback from an external field current controller (not FXMP25). This can be done from either an analogue input or by a high speed field bus. When parameter 5.48 is set to 1 this parameter is used as the flux feedback.

**Brake control function**

The brake control function can be used to control an electro-mechanical brake via the drive digital I/O.





- Parameter #5.28 (Field weakening compensation enable) - default changed to give no compensation for both USA and EUR defaults.
- Supply loss trip changed (Pr6.03 determines how supply loss function operates).

In mode 0 (dis) the firmware is unchanged:

- An auxiliary supply failure takes priority over the SL trip.
- If auxiliary supply fails –
  - **UU trip.**
  - Option modules informed, use external 24V if in range, stop the fan, power down save.
- If auxiliary supply is good -
  - **SL trip** if – phase order reported by the power processor has changed.

In mode 1 (StoP):

- Filtering has been reduced before alerting that a SL trip has occurred
- The power board latches the supply loss condition
- Auxiliary and SL trips are separated
- If auxiliary supply fails –
  - **UU trip.**
  - Option modules informed, use external 24V if in range, stop the fan, power down save.
- If drive enabled –
  - If phase rotation not detected and not already tripping UU – then **SL trip**
  - If supply is lost and not already tripping UU – then **SL trip**

- If drive disabled –  
No action is taken.

In mode 1 (ridEth):

- Power board uses the new short (8ms) filtering before alerting that a SL trip has occurred.
- The power board latches the supply loss condition
- Auxiliary and SL trips are independent
- If aux fails –
  - No UU trip.
  - Option modules informed, use external 24V if in range, stop the fan, power down save.
- If drive enabled (and after 1 second)–
  - If no supply has been detected –**trip SL** (This is to avoid a rogue AOP trip).
  - If supply is lost – Disable the armature
  - If supply is good – Start delay
- If drive disabled –
  - If delay incomplete wait 10ms with the armature still disabled
  - If delay over then enable the armature which will bring the sequencer back to RUN from DISABLE (if the RUN command is still valid.)

➤ Suppress SL trip when phasing back after disable.

➤ New auto-tune just for #5.29 and #5.30 added:

Pr5.12 = 4.

- Does not write or default the rated field comp, #5.74.
- Calls only the spinning auto-tune.

➤ Tacho loss trip above base speed:

Field weakening variation of the estimated speed could cause rogue tacho-loss trips.

- Use the user specified under speed window band up to base speed then:-
  - Keep the lower limit at the band lower value as if still below base speed.
  - Remove the over band upper value trip condition.

➤ Increase filtering of armature current used for IaRa compensation.

➤ Ra compensation ratio for speed feedback including negative ratio for speed droop.

➤ “Extra safe bridge change” slew hold.

The current demand is now held for 6 current cycles during an extra safe bridge changeover.

➤ Contactor control changed so that it now releases the line contactor in all tripped conditions. The line contactor cannot be closed if the drive is in a tripped state.

➤ A spinning motor at the start of autotune now results in a Tune4 trip not FbL.

➤ After an unsuccessful autotune the current loop gains (Pr4.13, Pr4.14 and Pr4.34) could be set to values beyond the range of the parameters. This has now been corrected.

- Thermal accumulator can be reset at power-up.

<b>04.16</b>	Thermal protection mode															
Coding	Bit	SP	FI	DE	TE	VM	DP	ND	RA	NC	NV	PT	US	RW	BU	PS
													1	1	1	
Range	0 to 3															
Default	0															
Update rate	Background read															

When set to 0 the accumulator is not reset at power up and the drive trips when the threshold is reached.

When set to 1 the accumulator is not reset at power up and the drive reduces the current limit to 100% when the threshold is reached.

When set to 2 the accumulator is reset at power up and the drive trips when the threshold is reached.

When set to 3 the accumulator is reset at power up and the drive reduces the current limit to 100% when the threshold is reached.

## **MANUAL UPDATE**

The short form guide, user guide and advanced user guides have all been updated.