Parameter Format and Routing System

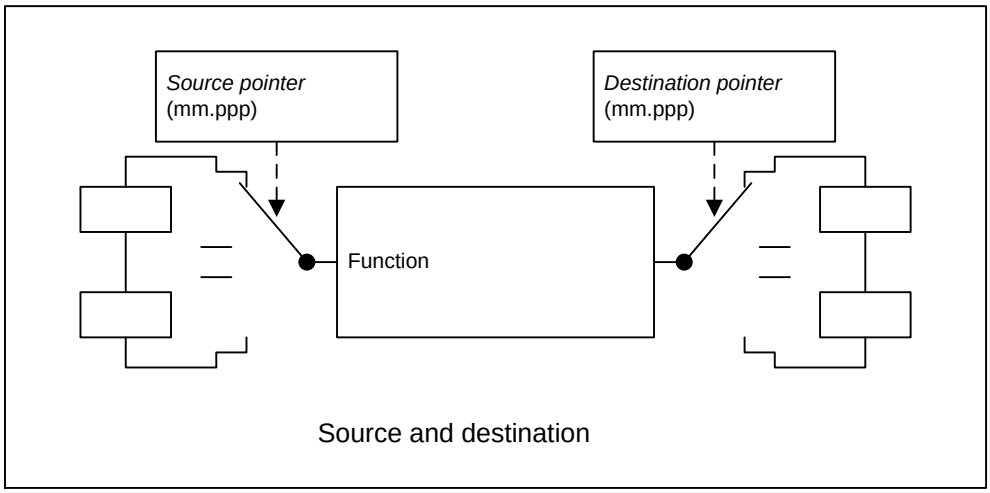
Last updated: 25/11/2019

Parameter Coding

Each parameter description has a coding field which includes the parameter attributes as given in the table below.

Coding	Meaning	Comments
FI	Filtered when displayed	The actual value of this parameter when accessed by an option module or via comms is not affected, but when displayed on a keypad the value is filtered. This allows values to be viewed even though they may change rapidly.
DE	Destination set-up parameter	The parameter is used by a function output to set up its target (destination) parameter.
TE	Text parameter	A text string is used to represent each value of this parameter when viewed on a keypad.
VM	Variable minimum/maximum	The minimum and maximum are not fixed but are defined by associated variable minimum/maximum.
ND	No default	The drive does not hold a default value for this parameter, and so loading defaults has no effect.
RA	Voltage rating dependent	When a parameter file is written to the drive via comms or transferred from a media card (SD or SMART card) parameters with this attribute cannot be transferred if the source drive voltage rating is different to the target drive voltage rating. If the voltage ratings are different these parameters are left at their default value.
NC	Not copied	The parameter cannot be saved or restored from a media card.
PT	Protected from destinations	If a destination is routed to this parameter, it will have no effect and cannot modify it.
W	Write allowed	The parameter can be read and written.
BU	Bit default / Unipolar	If the parameter is a 1 bit parameter then this attribute contains the parameter default value. Otherwise it indicates that the parameter is unipolar. Unipolar parameters are greater or equal to zero and can have an extended positive range. For example, an 8 bit signed parameter could only have a positive range up to 127, but an 8 bit unsigned parameter could have a range up to 255.

Parameter Routing



Source and destination

This section covers the routing system controlled by all sources and destinations that are defined in Menus 1 to 14, 21 to 23 and 31 to 41. The following rules apply to sources and destinations.

1. All new source and destination routings only change to new set-up locations when the drive is reset, or powered down and then powered up again.
2. When a destination is changed the old destination is written to the nearest possible value to zero within the range of the parameter. If the destination change is the result of loading defaults the old destination is then set to its default value. If the destination change is as a result of transferring parameters from a non-volatile media card the default is loaded unless the card data contains data for the old destination.
3. The internal representation of data within the routing system is from $-(2^{31}-1)$ to $2^{31}-1$ to give resolution that is greater or equal to all drive parameters. This allows data to be passed through user functions such as the variable selectors without loss of accuracy. To ensure data consistency a minimum of $-(2^{31}-1)$ is used for any parameters with an actual minimum of -2^{31} defined as a source or destination.

Sources

Some functions have source pointer parameters at their input (i.e. PID controller inputs, digital outputs), which allow the function input to be routed from a drive parameter. The following rules apply to sources.

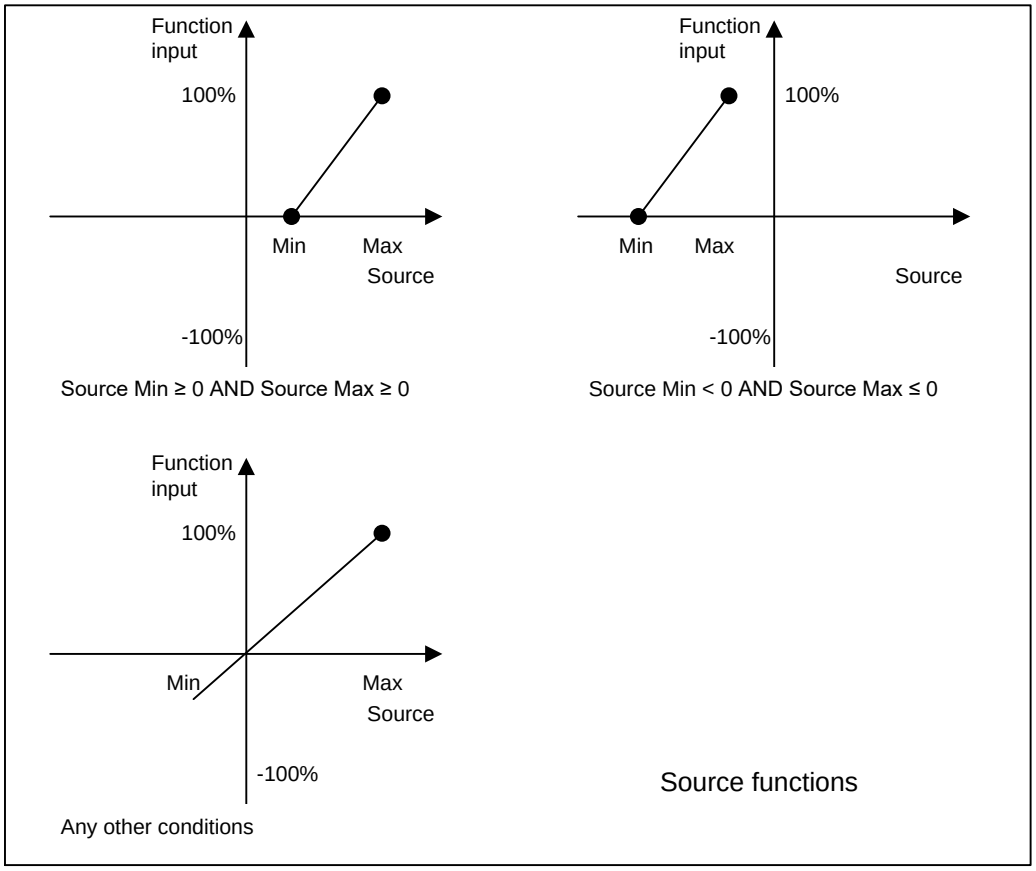
Source	Function Input	Results
Does not exist or 0.000	Any	Input = 0
Bit parameter	Bit	Input = Source value

Not a bit parameter	Bit	IF (Source > Source Max / 2) THEN
		Input = 1
		
		ELSE

		Input = 0

Any	Not bit	IF (Source Min ≥ 0 OR Source Max ≤ 0) THEN
		Input = (Source – Source Min) x 100% / (Source Max – Source Min)
		
		where Source is limited to be equal to or greater than 0
		
		ELSE IF |Source Max| ≥ |Source Min|
		Input = Source x 100% / |Source Max|
		
		ELSE
		Input = Source x 100% / |Source Min|

The following diagram demonstrates the relationship between the source value and the function input for the case where the function input is not a bit input.



Destinations
Some functions have destination pointer parameters at their outputs (i.e. PID controller outputs, digital inputs), which allow the function output to be routed to a drive parameter. The following rules apply to destinations.

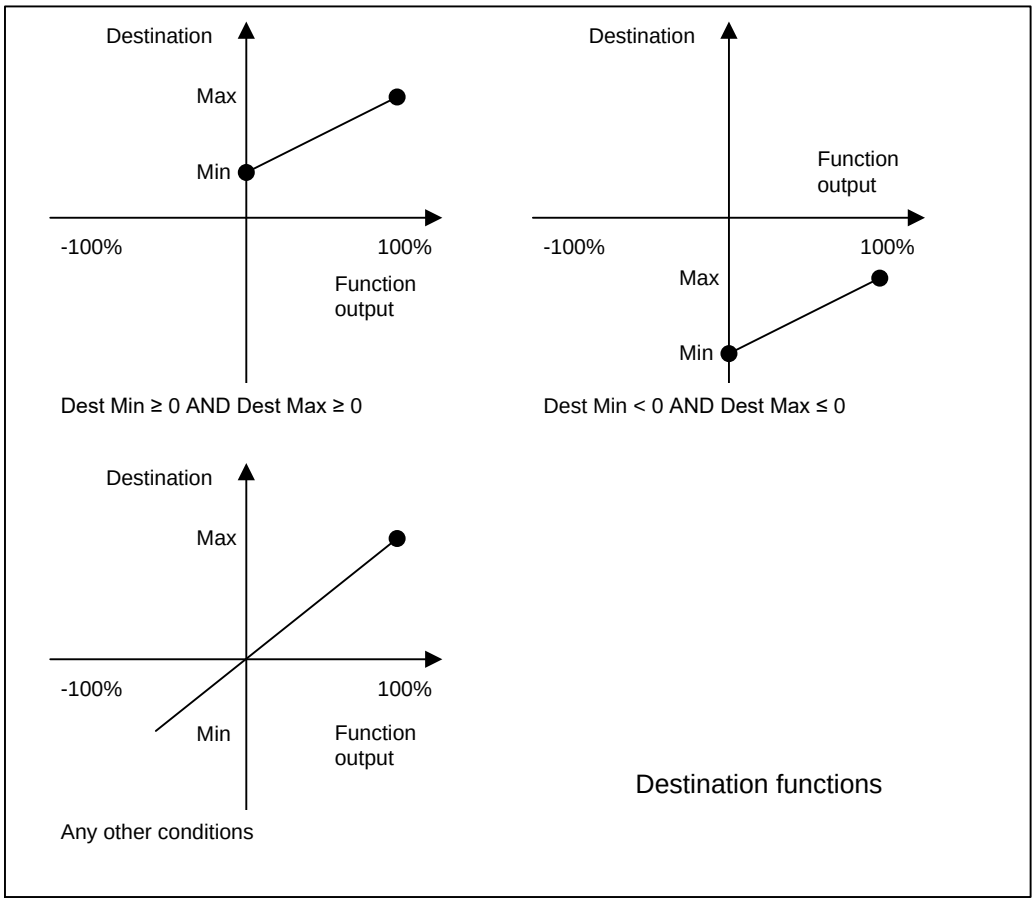
Function Output	**Destination**	**Results**
Any	Does not exist or protected (i.e. PT format bit is set) or 0.000	No effect
Bit	Any	Destination value = Output (i.e. 0 or 1) If the value of 0 or 1 is outside the range of the destination parameter, no data is written.

Not bit	Bit parameter	IF (Output < 50%) THEN
		Destination = 0
		
		ELSE
		Destination = 1

Not bit	Not a bit parameter	IF (Dest Min ≥ 0 OR Dest Max ≤ 0) THEN Destination = Dest Min + Output x (Dest Max – Dest Min) / 100% where the output is limited to be equal to or greater than 0 ELSE IF |Dest Max| ≥ |Dest Min| Destination = Output x |Dest Max| / 100%

		ELSE Destination = Output x |Dest Min| / 100%
Any	More than one destination pointer routed to the same parameter which has its DE attribute equal to 1	Destination = Undefined *Destination* trip that cannot be reset until conflict resolved

The following diagram demonstrates the relationship between the function output and the destination value for the case where the function output and the destination are not bit values.



Mapping percentage parameters to analogue outputs

If a parameter being mapped to an analogue output has units of percentage, then when the parameter has a value of 100% it will not necessarily mean that the output from the analogue output in voltage mode will be +10V. In some cases, the range value of a parameter with percentage units can be greater than +/- 100% such that the parameter value of 100% is not the maximum value for the parameter. For example, if a parameter has a range of +/-1000% and is mapped to an analogue output in voltage mode, then a parameter value of +100% will equate to 10% of full scale for the parameter and hence an analogue output voltage of 1V.

Example:
In this example the *Final Torque Reference* (04.003) will be mapped to an analogue output in voltage mode. The drive has a current rating of 5A, a Kc of 11.111, and will be used in RFC-S mode. The motor has a current rating of 1.6A. The user needs to know what the expected voltage should be from the analogue output when *Final Torque Reference* (04.003) has a value of 100%.

Final Torque Reference (04.003) has a variable maximum of VM_TORQUE_CURRENT which in turn is based on the variable maximum VM_MOTOR1_CURRENT_LIMIT. In RFC-S mode VM_MOTOR1_CURRENT_LIMIT is defined as (I_{MaxRef} / *Rated Current* (05.007)) x 100%, where I_{MaxRef} is defined as 0.9 x Kc. In this example Kc is 11.111 and the motor rated current is 16A, therefore, I_{MaxRef} is 10A and VM_MOTOR1_CURRENT_LIMIT is (10/625) x 100 = 625%.

A value of 100% in *Final Torque Reference* (04.003) will equate to (100/625) x 100 = 16% of the full scale for the parameter. Therefore, when this is routed to an analogue output, the output voltage will be 16% of 10V or 1.6V.