Manual Supplement

Manual Title:	NORMA 4000/5000 Operators	Supplement Issue:	1
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This supplement contains information necessary to ensure the accuracy of the above manual.

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Change #1, 55306, 54817

On page 11-4, under ***Channel Specifications,*** *Current*, Measuring connection for shunt or probe, change:

From:

Ranges	30 – 100 mV - 0.3 – 1 – 3 – 10 A

To:

Ranges	30 – 100 mV - 0.3 – 1 –3 – 10 V

On page 11-5, replace the ***Intrinsic Uncertainty (Reference Conditions)*** table with the following*:*

Intrinsic Uncertainty (Reference Conditions)

			PP42	PP50	PP52	PP54	PP64
Sample Rate			341 kHz	1024 kHz	341 kHz	341 kHz	341 kHz
Bandwidth			3 MHz	10 MHz	3 MHz	3 MHz	3 MHz
Voltage Current via BNC	45 to 65 Hz	% of reading + % of range	0.1 + 0.1	0.05 + 0.05	0.05 + 0.05	0.05 + 0.05	0.01 + 0.02
	10 to 1000 Hz		0.1 + 0.1	0.05 + 0.05	0.05 + 0.05	0.05 + 0.05	0.03 + 0.02
	10 kHz		0.25 + 0.25	0.2 + 0.2	0.2 + 0.2	0.2 + 0.2	0.2 + 0.2
	100 kHz		0.5 + 0.5	0.4 + 0.4	0.4 + 0.4	0.4 + 0.4	0.4 + 0.4
	45 to 65 Hz	Angular error (degrees)	0.005	0.005	0.005	0.005	0.002
	10 to 1000 Hz		0.005 + 0.005/kHz	0.005 + 0.005/kHz	0.005 + 0.005/kHz	0.005 + 0.005/kHz	0.005 + 0.005/kHz
Current Direct Input	45 to 65 Hz [1]	% of reading + % of range	0.1 + 0.1	0.05 + 0.05	0.05 + 0.05	0.05 + 0.05	0.01 + 0.02
	10 to 1000 Hz		0.1 + 0.1	0.05 + 0.05	0.05 + 0.05	0.05 + 0.05	0.03 + 0.02
	10 kHz		0.25 + 0.25	0.2 + 0.2	0.2 + 0.2	0.2 + 0.2	0.2 + 0.2
	100 kHz		0.5 + 0.5	0.4 + 0.4	0.4 + 0.4	0.4 + 0.4	0.4 + 0.4
	DC to 10 Hz [2]		0.2 + 0.2	0.1 + 0.1	0.1 + 0.1	0.1 + 0.1	0.1 + 0.1
	45 to 65 Hz	Angular error (degrees)	0.005	0.005	0.005	0.005	0.0025
	10 to 1000 Hz		0.005 + 0.015/kHz	0.005 + 0.010/kHz	0.005 + 0.010/kHz	0.005 + 0.005/kHz	0.005 + 0.005/kHz

[1] Anti-aliasing filter on, AC-coupling
[2] Anti-aliasing filter on, DC-coupling, typical max. error

Change #2

On page 10-6, add the following:

Optional Process Interface Formulas

Torque $M_d = S_{M_d} * \left(\frac{1}{T} \int_0^T u_{(t)} dt - Z_{M_d} \right)$

M_d	torque in Nm
S_{Md}	scale factor for torque in Nm/V or in Nm/Hz
Z_{Md}	zero offset for torque in V or in Hz
$u_{(t)}$	analogue torque signal at measuring input
or	
	pulses of digital torque signal at measuring input
T	averaging interval in seconds

Speed (pulse input): $n = \frac{1}{S_n} * \left(\frac{1}{T} \sum_0^T pulses * 60 - Z_n \right)$

n	speed in 1/min
S_n	scale factor pulse transmitter in pulses/revolution
Z_n	zero offset for pulse transmitter in Hz (typically =0)
T	averaging interval in seconds

Speed (analogue input): $n = S_n * \left(\frac{1}{T} \int_0^T u_{(t)} dt - Z_n \right)$

n	speed in 1/min
S_n	scale factor for speed in rpm/V
Z_n	zero offset for speed in V
$u_{(t)}$	analogue speed signal at measuring input
T	averaging interval in seconds

Mechanical Power $P_m = n * M_d * 2\pi/60$

P_m	mechanical power in W

Efficiency $\eta = \frac{P_m}{P} * 100\%$ (MOT) or $\eta = \frac{P}{P_m} * 100\%$ (GEN)

η	efficiency
P	el. power reference
P_m	mechanical power

Slip $SL = \frac{f - \frac{n}{60} * p}{f} * 100\%$

p	number of pole pairs
f	el. frequency [Hz]