

## Magnetic Flowmeters

### Electrical Conductivity of Process Liquids



The purpose of this technical information document is to provide a listing of the electrical conductivity of various process liquids. The process liquids listed are separated into three tables. Table 1 lists aqueous solutions, Table 2 lists pure liquids, and Table 3 lists miscellaneous liquids. The conductivity values listed are based on published data, and are offered here as a convenience to the user as an aid in determining whether a magnetic flowmeter could measure the flow of a particular process liquid. For a magnetic flowmeter to work on a given process liquid, the liquid must possess a minimum level of conductivity.

The minimum conductivity required for a Foxboro 2800 Series Flowtube used with an IMT96 Magnetic Flow Transmitter (MagEXPERT™) applications is 2  $\mu\text{S}/\text{cm}$ . The minimum conductivity required for an 8000A, 9100A, 9200A, 9300A, or 8300 Series Flowtube used with an IMT25 I/A Series Transmitter (pulsed dc applications) is 5  $\mu\text{S}/\text{cm}$ . The minimum process fluid conductivity for the 4700S sanitary flowtube with a 47 or 48 Transmitter is 5  $\mu\text{S}/\text{cm}$ .

The maximum cable length between flowtube and a pulsed dc transmitter, using Foxboro cable Part Number R0101ZS, is 300 m (1000 ft) provided that the coil drive cable and the signal cable are in separate conduits. Refer to MI 021-402 for information on the process fluid conductivity and cabling when using a 2800 Series Flowtube with an IMT96 Transmitter.

In conjunction with the process liquid conductivities listed here, the user is also directed to technical information document TI 27-71f. This TI aids the user in selecting the process-wetted materials (for example, flowtube lining, electrode material, and so forth.) recommended for a particular process, whether the process be corrosive, abrasive, or sanitary.

Again, the data listed in this TI and TI 27-71f are presented for the user's convenience, and are based on published data and experience.

Table 1. Electrical Conductivity of Aqueous Solutions

Name of Aqueous Solution	Chemical Formula	Concentration by Weight, %	Values Listed at a Temperature of	Conductivity in $\mu\text{S/cm}$
Acetic Acid	$\text{CH}_3\text{CO}_2\text{H}$	0.3	18° C (64° F)	$3.18 \times 10^2$
		1		$5.84 \times 10^2$
		5		$1.23 \times 10^3$
		10		$1.53 \times 10^3$
		20		$1.61 \times 10^3$
		30		$1.40 \times 10^3$
		40		$1.08 \times 10^3$
		50		$7.40 \times 10^2$
		60		$4.56 \times 10^2$
		70		$2.35 \times 10^2$
		99.7		$4.00 \times 10^{-2*}$
Ammonia	$\text{NH}_3$	0.10	15° C (59° F)	$2.51 \times 10^2$
		0.40		$4.92 \times 10^2$
		0.80		$6.57 \times 10^2$
		1.60		$8.67 \times 10^2$
		4.01		$1.10 \times 10^3$
		8.03		$1.04 \times 10^3$
		16.15		$6.32 \times 10^2$
		30.50		$1.93 \times 10^2$
Ammonium Chloride	$\text{NH}_4\text{Cl}$	5	18° C (64° F)	$9.18 \times 10^4$
		10		$1.78 \times 10^5$
		15		$2.59 \times 10^5$
		20		$3.37 \times 10^5$
		25		$4.03 \times 10^5$
Ammonium Iodide	$\text{NH}_4\text{I}$	10	18° C (64° F)	$7.72 \times 10^4$
		20		$1.60 \times 10^5$
		50		$4.20 \times 10^5$
Ammonium Nitrate	$\text{NH}_4\text{NO}_3$	5	15° C (59° F)	$5.90 \times 10^4$
		10		$1.12 \times 10^5$
		30		$2.84 \times 10^5$
		50		$3.63 \times 10^5$
Ammonium Sulfate	$(\text{NH}_4)_2\text{SO}_4$	5	15° C (59° F)	$5.52 \times 10^4$
		10		$1.01 \times 10^5$
		20		$1.78 \times 10^5$
		30		$2.29 \times 10^5$
		31		$2.32 \times 10^5$
Barium Chloride	$\text{BaCl}_2$	5	18° C (64° F)	$3.89 \times 10^4$
		10		$7.33 \times 10^4$
		15		$1.05 \times 10^5$
		24		$1.53 \times 10^5$
Barium Nitrate	$\text{Ba}(\text{NO}_3)_2$	4.2	18° C (64° F)	$2.09 \times 10^4$
		8.4		$3.52 \times 10^4$
Barium Hydroxide	$\text{Ba}(\text{OH})_2$	1.25	18° C (64° F)	$2.50 \times 10^4$
		2.50		$4.79 \times 10^4$

\* If asterisk is noted against conductivity value, it denotes that the value may be too low for the magnetic flowmeter. Refer to the particular flowmeter specification for minimum allowable conductivity.

Table 1. Electrical Conductivity of Aqueous Solutions (Continued)

Name of Aqueous Solution	Chemical Formula	Concentration by Weight, %	Values Listed at a Temperature of	Conductivity in $\mu\text{S}/\text{cm}$
Butyric Acid	$\text{C}_3\text{H}_7\text{CO}_2\text{H}$	1	18°C (64°F)	$4.55 \times 10^{-2}$
		5.02		$8.63 \times 10^{-2}$
		10.07		$9.86 \times 10^{-2}$
		15.03		$9.55 \times 10^{-2}$
		20.01		$8.88 \times 10^{-2}$
		50.04		$2.96 \times 10^{-2}$
		70.01		$5.60 \times 10^{-1}$
		100		$6.00 \times 10^{-2*}$
Cadmium Bromide	$\text{CdBr}_2$	0.0324	18°C (64°F)	$2.31 \times 10^{-2}$
		0.0748		$4.70 \times 10^{-2}$
		0.154		$8.44 \times 10^{-2}$
		0.506		$2.13 \times 10^{-3}$
		1.0		$3.57 \times 10^{-3}$
		5.0		$1.09 \times 10^{-4}$
		10.0		$1.64 \times 10^{-4}$
		20.0		$2.36 \times 10^{-4}$
		30.0		$2.73 \times 10^{-4}$
		43.0		$2.61 \times 10^{-4}$
Cadmium Chloride	$\text{CdCl}_2$	0.0503	18°C (64°F)	$4.95 \times 10^{-2}$
		0.200		$1.56 \times 10^{-3}$
		0.599		$3.64 \times 10^{-3}$
		1.0		$5.51 \times 10^{-3}$
		5.0		$1.67 \times 10^{-4}$
		10.0		$2.41 \times 10^{-4}$
		15.0		$2.82 \times 10^{-4}$
		20		$2.99 \times 10^{-4}$
		30		$2.82 \times 10^{-4}$
		40		$2.21 \times 10^{-4}$
		50		$1.37 \times 10^{-4}$
Cadmium Iodide	$\text{CdI}_2$	1	18°C (64°F)	$2.12 \times 10^{-3}$
		5		$6.09 \times 10^{-3}$
		10		$1.04 \times 10^{-4}$
		15		$1.46 \times 10^{-4}$
		20		$1.86 \times 10^{-4}$
		30		$2.54 \times 10^{-4}$
		40		$3.03 \times 10^{-4}$
		45		$3.14 \times 10^{-4}$
Cadmium Nitrate	$\text{Cd}(\text{NO}_3)_2$	1	18°C (64°F)	$6.94 \times 10^{-3}$
		5		$2.89 \times 10^{-4}$
		10		$5.13 \times 10^{-4}$
		20		$8.27 \times 10^{-4}$
		30		$9.56 \times 10^{-4}$
		40		$9.03 \times 10^{-4}$
		48		$7.55 \times 10^{-4}$

\* If asterisk is noted against conductivity value, it denotes that the value may be too low for the magnetic flowmeter. Refer to the particular flowmeter specification for minimum allowable conductivity.

Table 1. Electrical Conductivity of Aqueous Solutions (Continued)

Name of Aqueous Solution	Chemical Formula	Concentration by Weight, %	Values Listed at a Temperature of	Conductivity in $\mu\text{S}/\text{cm}$
Cadmium Sulfate	$\text{CdSO}_4$	0.0289	18°C (64°F)	$2.47 \times 10^2$
		0.0999		$6.92 \times 10^2$
		0.495		$2.39 \times 10^3$
		1		$4.16 \times 10^3$
		5		$1.46 \times 10^4$
		10		$2.47 \times 10^4$
		25		$4.30 \times 10^4$
		36		$4.21 \times 10^4$
Calcium Chloride	$\text{CaCl}_2$	5	18°C (64°F)	$6.43 \times 10^4$
		10		$1.14 \times 10^5$
		20		$1.73 \times 10^5$
		25		$1.78 \times 10^5$
		30		$1.66 \times 10^5$
		35		$1.37 \times 10^5$
Calcium Nitrate	$\text{Ca}(\text{NO}_3)_2$	6.25	18°C (64°F)	$4.91 \times 10^4$
		12.50		$8.04 \times 10^4$
		25.00		$1.05 \times 10^5$
		37.50		$8.76 \times 10^4$
		50.00		$4.69 \times 10^4$
Chromic Acid	$\text{CrO}_3$	35%	25°C (77°F)	$6.70 \times 10^5$
Citric Acid	$\text{C}_6\text{H}_8\text{O}_7$	20%	25°C (77°F)	$7.9 \times 10^3$
Cupric Chloride	$\text{CuCl}_2$	1.35	18°C (64°F)	$1.87 \times 10^4$
		9		$7.16 \times 10^4$
		18.20		$9.24 \times 10^4$
		28.75		$8.97 \times 10^4$
		35.2		$6.99 \times 10^4$
Cupric Nitrate	$\text{Cu}(\text{NO}_3)_2$	5	15°C (59°F)	$3.65 \times 10^4$
		10		$6.35 \times 10^4$
		15		$8.58 \times 10^4$
		20		$1.02 \times 10^5$
		25		$1.09 \times 10^5$
		35		$1.06 \times 10^5$
Cupric Sulfate	$\text{CuSO}_4$	2.5	18°C (64°F)	$1.09 \times 10^4$
		5		$1.89 \times 10^4$
		10		$3.20 \times 10^4$
		15		$4.21 \times 10^4$
		17.5		$4.58 \times 10^4$
Ferric Chloride	$\text{FeCl}_3$	16%	25°C (77°F)	$9.6 \times 10^4$
Ferrous Sulfate	$\text{FeSO}_4$	24%	25°C (77°F)	$5.3 \times 10^4$

\* If asterisk is noted against conductivity value, it denotes that the value may be too low for the magnetic flowmeter. Refer to the particular flowmeter specification for minimum allowable conductivity.

Table 1. Electrical Conductivity of Aqueous Solutions (Continued)

Name of Aqueous Solution	Chemical Formula	Concentration by Weight, %	Values Listed at a Temperature of	Conductivity in $\mu\text{S/cm}$
Formic Acid	$\text{HCO}_2\text{H}$	4.94	18°C (64°F)	$5.50 \times 10^3$
		9.55		$7.56 \times 10^3$
		20.34		$9.84 \times 10^3$
		29.83		$1.04 \times 10^4$
		39.95		$9.84 \times 10^3$
		50.02		$8.64 \times 10^3$
		70.06		$5.23 \times 10^3$
		89.02		$1.87 \times 10^3$
		100.00		$2.80 \times 10^2$
Hydriodic Acid	HI	5	15°C (59°F)	$1.33 \times 10^5$
Hydrobromic Acid	HBr	5	15°C (59°F)	$1.91 \times 10^5$
		10		$3.55 \times 10^5$
		15		$4.94 \times 10^5$
Hydrochloric Acid	HCl	5	15°C (59°F)	$3.95 \times 10^5$
		10		$6.30 \times 10^5$
		20		$7.62 \times 10^5$
		30		$6.62 \times 10^5$
		40		$5.15 \times 10^5$
Hydrofluoric Acid	HF	0.004	18°C (64°F)	$2.50 \times 10^2$
		0.007		$3.80 \times 10^2$
		0.015		$5.00 \times 10^2$
		0.030		$8.00 \times 10^2$
		0.060		$1.23 \times 10^3$
		0.121		$2.10 \times 10^3$
		0.242		$3.63 \times 10^3$
		0.484		$6.73 \times 10^3$
		1.50		$1.98 \times 10^4$
		2.48		$3.15 \times 10^4$
		4.80		$5.93 \times 10^4$
		7.75		$9.63 \times 10^4$
		15.85		$1.85 \times 10^5$
		24.50		$2.83 \times 10^5$
		29.80		$3.41 \times 10^5$
Lactic Acid	$\text{CH}_3\text{CHOHCOOH}$	15	25°C (77°F)	$5.7 \times 10^3$
Lanthanum Nitrate	$\text{La}(\text{NO}_3)_3$	28	25°C (77°F)	$9.7 \times 10^4$
Lead Nitrate	$\text{Pb}(\text{NO}_3)_2$	5	15°C (59°F)	$1.91 \times 10^4$
		10		$3.22 \times 10^4$
		15		$4.29 \times 10^4$
		20		$5.21 \times 10^4$
		25		$6.00 \times 10^4$
		30		$6.68 \times 10^4$
Lithium Carbonate	$\text{Li}_2\text{CO}_3$	0.20	18°C (64°F)	$3.43 \times 10^3$
		0.63		$8.85 \times 10^3$

\* If asterisk is noted against conductivity value, it denotes that the value may be too low for the magnetic flowmeter. Refer to the particular flowmeter specification for minimum allowable conductivity.

Table 1. Electrical Conductivity of Aqueous Solutions (Continued)

Name of Aqueous Solution	Chemical Formula	Concentration by Weight, %	Values Listed at a Temperature of	Conductivity in $\mu\text{S/cm}$
Lithium Chloride	LiCl	2.5 5 10 20 30 40	18°C (64°F)	$4.10 \times 10^4$ $7.33 \times 10^4$ $1.22 \times 10^5$ $1.68 \times 10^5$ $1.40 \times 10^5$ $8.44 \times 10^4$
Lithium Hydroxide	LiOH	1.25 2.5 5 7.5	18°C (64°F)	$7.81 \times 10^4$ $1.42 \times 10^5$ $2.40 \times 10^5$ $3.00 \times 10^5$
Lithium Iodide	LiI	5 10 20 25	18°C (64°F)	$2.96 \times 10^4$ $5.73 \times 10^4$ $1.09 \times 10^5$ $1.35 \times 10^5$
Lithium Sulfate	Li <sub>2</sub> SO <sub>4</sub>	5 10	15°C (59°F)	$4.00 \times 10^4$ $6.10 \times 10^4$
Magnesium Chloride	MgCl <sub>2</sub>	5 10 20 30 34	18°C (64°F)	$6.83 \times 10^4$ $1.13 \times 10^5$ $1.40 \times 10^5$ $1.06 \times 10^5$ $7.68 \times 10^4$
Magnesium Nitrate	Mg(NO <sub>3</sub> ) <sub>2</sub>	5 10 17	18°C (64°F)	$4.38 \times 10^4$ $7.70 \times 10^4$ $1.10 \times 10^4$
Magnesium Sulfate	MgSO <sub>4</sub>	5 10 15 25	15°C (59°F)	$2.63 \times 10^4$ $4.14 \times 10^4$ $4.80 \times 10^4$ $4.15 \times 10^4$
Manganese Chloride	MnCl <sub>2</sub>	5 10 15 20 25 28	15°C (59°F)	$5.26 \times 10^4$ $8.44 \times 10^4$ $1.06 \times 10^5$ $1.13 \times 10^5$ $1.09 \times 10^5$ $1.02 \times 10^5$
Manganous Sulfate	MnSO <sub>4</sub>	22	25°C (77°F)	$5.15 \times 10^4$
Mercuric Bromide	HgBr <sub>2</sub>	0.223 0.422	18°C (64°F)	$1.60 \times 10^1$ $2.60 \times 10^1$
Mercuric Chloride	HgCl <sub>2</sub>	0.229 1.013 5.08	18°C (64°F)	$4.40 \times 10^1$ $1.14 \times 10^2$ $4.21 \times 10^2$

\* If asterisk is noted against conductivity value, it denotes that the value may be too low for the magnetic flowmeter. Refer to the particular flowmeter specification for minimum allowable conductivity.

Table 1. Electrical Conductivity of Aqueous Solutions (Continued)

Name of Aqueous Solution	Chemical Formula	Concentration by Weight, %	Values Listed at a Temperature of	Conductivity in $\mu\text{S}/\text{cm}$
Nitric Acid	$\text{HNO}_3$	6.2	18°C (64°F)	$3.12 \times 10^5$
		12.4		$5.42 \times 10^5$
		24.8		$7.68 \times 10^5$
		31.0		$7.82 \times 10^5$
		37.2		$7.55 \times 10^5$
		49.6		$6.34 \times 10^5$
		62.0		$4.90 \times 10^5$
Oxalic Acid	$(\text{CO}_2\text{H})_2$	3.5	18°C (64°F)	$5.08 \times 10^4$
		7.0		$7.83 \times 10^4$
Phosphoric Acid	$\text{H}_3\text{PO}_4$	10	15°C (59°F)	$5.66 \times 10^4$
		20		$1.13 \times 10^5$
		30		$1.65 \times 10^5$
		35		$1.86 \times 10^5$
		50		$2.07 \times 10^5$
		70		$1.47 \times 10^5$
		80		$9.79 \times 10^4$
		85		$7.80 \times 10^4$
		87		$7.09 \times 10^4$
Potassium Acetate	$\text{KCH}_3\text{CO}_2$	4.67	15°C (59°F)	$3.47 \times 10^4$
		9.33		$6.25 \times 10^4$
		28.00		$1.26 \times 10^5$
		46.67		$1.12 \times 10^5$
		65.33		$4.79 \times 10^4$
Potassium Bromide	$\text{KBr}$	5	15°C (59°F)	$4.65 \times 10^4$
		10		$9.28 \times 10^4$
		20		$1.91 \times 10^5$
		30		$2.92 \times 10^5$
		36		$3.51 \times 10^5$
Potassium Carbonate	$\text{K}_2\text{CO}_3$	5	15°C (59°F)	$5.61 \times 10^4$
		10		$1.04 \times 10^5$
		20		$1.81 \times 10^5$
		30		$2.22 \times 10^5$
		40		$2.17 \times 10^5$
		50		$1.47 \times 10^5$
Potassium Chloride	$\text{KCl}$	5	18°C (64°F)	$6.90 \times 10^4$
		10		$1.36 \times 10^5$
		15		$2.02 \times 10^5$
		20		$2.68 \times 10^5$
		21		$2.81 \times 10^5$
Potassium Cyanide	$\text{KCN}$	3.25	15°C (59°F)	$5.27 \times 10^4$
		6.5		$1.03 \times 10^5$
Potassium Fluoride	$\text{KF}$	5	18°C (64°F)	$6.52 \times 10^4$
		10		$1.21 \times 10^5$
		20		$2.08 \times 10^5$
		30		$2.56 \times 10^5$
		40		$2.52 \times 10^5$

\* If asterisk is noted against conductivity value, it denotes that the value may be too low for the magnetic flowmeter. Refer to the particular flowmeter specification for minimum allowable conductivity.

Table 1. Electrical Conductivity of Aqueous Solutions (Continued)

Name of Aqueous Solution	Chemical Formula	Concentration by Weight, %	Values Listed at a Temperature of	Conductivity in $\mu\text{S/cm}$
Potassium Hydroxide	KOH	4.2 8.4 16.8 25.2 33.6 42.0	15°C (59°F)	$1.46 \times 10^5$ $2.72 \times 10^5$ $4.56 \times 10^5$ $5.40 \times 10^5$ $5.22 \times 10^5$ $4.21 \times 10^5$
Potassium Iodide	KI	5 10 20 30 40 55	18°C (64°F)	$3.38 \times 10^4$ $6.80 \times 10^4$ $1.46 \times 10^5$ $2.30 \times 10^5$ $3.17 \times 10^5$ $4.23 \times 10^5$
Potassium Nitrate	KNO <sub>3</sub>	5 10 15 20 22	18°C (64°F)	$4.54 \times 10^4$ $8.39 \times 10^4$ $1.19 \times 10^5$ $1.51 \times 10^5$ $1.63 \times 10^5$
Potassium Oxalate	K <sub>2</sub> C <sub>2</sub> O <sub>4</sub>	5 10	18°C (64°F)	$4.88 \times 10^4$ $9.15 \times 10^4$
Potassium Sulfate	K <sub>2</sub> SO <sub>4</sub>	5 10	18°C (64°F)	$4.58 \times 10^4$ $8.60 \times 10^4$
Potassium Sulfide	K <sub>2</sub> S	3.18 4.98 9.93 19.96 29.97 38.08 47.26	18°C (64°F)	$8.45 \times 10^4$ $1.28 \times 10^5$ $2.34 \times 10^5$ $4.02 \times 10^5$ $4.56 \times 10^5$ $4.11 \times 10^5$ $2.58 \times 10^5$
Procaine Hydrochloride	C <sub>13</sub> H <sub>20</sub> N <sub>2</sub> O <sub>2</sub>	32	25°C (77°F)	$3.4 \times 10^4$
Propionic Acid	C <sub>3</sub> H <sub>6</sub> O <sub>2</sub>	1.00 5.01 10.08 20.02 30.03 50.09 69.99 100.00	18°C (64°F)	$4.79 \times 10^2$ $9.25 \times 10^2$ $1.11 \times 10^3$ $1.04 \times 10^3$ $8.18 \times 10^2$ $3.77 \times 10^2$ $8.50 \times 10^1$ $7.00 \times 10^{-2*}$
Silver Nitrate	AgNO <sub>3</sub>	5 10 20 40 60	18°C (64°F)	$2.56 \times 10^4$ $4.76 \times 10^4$ $8.72 \times 10^4$ $1.57 \times 10^5$ $2.10 \times 10^5$
Sodium Acetate	CH <sub>3</sub> CO <sub>2</sub> Na	5 20 32	18°C (64°F)	$2.95 \times 10^4$ $6.51 \times 10^4$ $5.69 \times 10^4$

\* If asterisk is noted against conductivity value, it denotes that the value may be too low for the magnetic flowmeter. Refer to the particular flowmeter specification for minimum allowable conductivity.



Table 1. Electrical Conductivity of Aqueous Solutions (Continued)

Name of Aqueous Solution	Chemical Formula	Concentration by Weight, %	Values Listed at a Temperature of	Conductivity in $\mu\text{S/cm}$
Sodium Carbonate	$\text{Na}_2\text{CO}_3$	5	18°C (64°F)	$4.51 \times 10^4$
		10		$7.05 \times 10^4$
		15		$8.36 \times 10^4$
Sodium Chloride	$\text{NaCl}$	5	18°C (64°F)	$6.72 \times 10^4$
		10		$1.21 \times 10^5$
		15		$1.64 \times 10^5$
		20		$1.96 \times 10^5$
		25		$2.14 \times 10^5$
		26		$2.15 \times 10^5$
Sodium Citrate	$\text{Na}_3\text{C}_6\text{H}_5\text{O}_7$	23	25°C (77°F)	$6.45 \times 10^4$
Sodium Diatrizoate	$\text{C}_{11}\text{H}_8\text{NO}_4\text{I}_3\text{Na}$	40	25°C (77°F)	$1.85 \times 10^4$
Sodium Dichromate	$\text{Na}_2\text{Cr}_2\text{O}_7$	40	25°C (77°F)	$1.65 \times 10^5$
Sodium Hydroxide	$\text{NaOH}$	1	18°C (64°F)	$4.65 \times 10^4$
		2		$8.87 \times 10^4$
		4		$1.63 \times 10^5$
		6		$2.24 \times 10^5$
		8		$2.73 \times 10^5$
		10		$3.09 \times 10^5$
		15		$3.49 \times 10^5$
		20		$3.28 \times 10^5$
		25		$2.72 \times 10^5$
		27.5		$2.39 \times 10^5$
		30		$2.07 \times 10^5$
		32.5		$1.80 \times 10^5$
		35		$1.56 \times 10^5$
		37.5		$1.36 \times 10^5$
		40		$1.21 \times 10^5$
Sodium Iodide	$\text{NaI}$	5	18°C (64°F)	$2.98 \times 10^4$
		10		$5.81 \times 10^4$
		20		$1.14 \times 10^5$
		40		$2.11 \times 10^5$
Sodium Nitrate	$\text{NaNO}_3$	5	18°C (64°F)	$4.36 \times 10^4$
		10		$7.82 \times 10^4$
		20		$1.30 \times 10^5$
		30		$1.61 \times 10^5$
Sodium Phosphate	$\text{NaH}_2\text{PO}_4$	28	25°C (77°F)	$6.00 \times 10^4$
Sodium Sulfate	$\text{Na}_2\text{SO}_4$	5	18°C (64°F)	$4.09 \times 10^4$
		10		$6.87 \times 10^4$
		15		$8.86 \times 10^4$

\* If asterisk is noted against conductivity value, it denotes that the value may be too low for the magnetic flowmeter. Refer to the particular flowmeter specification for minimum allowable conductivity.

Table 1. Electrical Conductivity of Aqueous Solutions (Continued)

Name of Aqueous Solution	Chemical Formula	Concentration by Weight, %	Values Listed at a Temperature of	Conductivity in $\mu\text{S}/\text{cm}$
Sodium Sulfide	$\text{Na}_2\text{S}$	2.02	18°C (64°F)	$6.12 \times 10^4$
		5.03		$1.32 \times 10^5$
		9.64		$2.02 \times 10^5$
		14.02		$2.40 \times 10^5$
		16.12		$2.24 \times 10^5$
		18.15		$2.18 \times 10^5$
Sodium Tartrate	$\text{Na}_4\text{C}_4\text{H}_4\text{O}_6$	24	25°C (77°F)	$6.85 \times 10^4$
Sodium Thiocyanate	$\text{NaSCN}$	34	25°C (77°F)	$2.06 \times 10^5$
Sodium Thiosulfate	$\text{Na}_2\text{S}_2\text{O}_3$	29	25°C (77°F)	$1.52 \times 10^5$
Strontium Chloride	$\text{SrCl}_2$	5	18°C (64°F)	$4.83 \times 10^4$
		10		$8.86 \times 10^4$
		15		$1.23 \times 10^5$
		22		$1.58 \times 10^5$
Strontium Nitrate	$\text{Sr}(\text{NO}_3)_2$	5	15°C (59°F)	$3.09 \times 10^4$
		10		$5.27 \times 10^4$
		15		$6.90 \times 10^4$
		20		$8.02 \times 10^4$
		25		$8.66 \times 10^4$
		35		$8.61 \times 10^4$
Sulfuric Acid	$\text{H}_2\text{SO}_4$	5	18°C (64°F)	$2.09 \times 10^5$
		10		$3.92 \times 10^5$
		15		$5.43 \times 10^5$
		20		$6.53 \times 10^5$
		25		$7.17 \times 10^5$
		30		$7.39 \times 10^5$
		35		$7.24 \times 10^5$
		40		$6.80 \times 10^5$
		50		$5.41 \times 10^5$
		60		$3.73 \times 10^5$
		65		$2.91 \times 10^5$
		70		$2.16 \times 10^5$
		75		$1.52 \times 10^5$
		80		$1.11 \times 10^5$
		85		$9.85 \times 10^4$
		86		$9.92 \times 10^4$
		87		$1.01 \times 10^5$
		88		$1.03 \times 10^5$
		89		$1.06 \times 10^5$
		90		$1.08 \times 10^5$
		91		$1.09 \times 10^5$
		92		$1.10 \times 10^5$
		94		$1.07 \times 10^5$
		95		$1.03 \times 10^5$
		96		$9.44 \times 10^4$
		97		$8.00 \times 10^4$
		99.4		$8.50 \times 10^3$

\* If asterisk is noted against conductivity value, it denotes that the value may be too low for the magnetic flowmeter. Refer to the particular flowmeter specification for minimum allowable conductivity.

Table 1. Electrical Conductivity of Aqueous Solutions (Continued)

Name of Aqueous Solution	Chemical Formula	Concentration by Weight, %	Values Listed at a Temperature of	Conductivity in $\mu\text{S/cm}$
Tartaric Acid	$\text{C}_4\text{H}_6\text{O}_6$	24	25°C (77°F)	$1.18 \times 10^{-4}$
Zinc Chloride	$\text{ZnCl}_2$	2.5	15°C (59°F)	$2.76 \times 10^{-4}$
		5		$4.83 \times 10^{-4}$
		10		$7.27 \times 10^{-4}$
		20		$9.12 \times 10^{-4}$
		30		$9.26 \times 10^{-4}$
		40		$8.45 \times 10^{-4}$
		60		$3.69 \times 10^{-4}$
Zinc Sulfate	$\text{ZnSO}_4$	5	18°C (64°F)	$1.91 \times 10^{-4}$
		10		$3.21 \times 10^{-4}$
		15		$4.15 \times 10^{-4}$
		25		$4.80 \times 10^{-4}$
		30		$4.44 \times 10^{-4}$

\* If asterisk is noted against conductivity value, it denotes that the value may be too low for the magnetic flowmeter. Refer to the particular flowmeter specification for minimum allowable conductivity.

Table 2. Electrical Conductivity of Pure Liquids

Name of Pure Liquid	Value Listed at Temperature of**	Conductivity in $\mu\text{S/cm}$	Name of Pure Liquid	Value Listed at Temperature of**	Conductivity in $\mu\text{S/cm}$
Acetaldehyde	15°C (59°F)	1.7*	Bromine	17.2°C (63°F)	$1.3 \times 10^{-7}$ *
Acetamide	100°C (212°F)	43	Bromobenzene	25°C (77°F)	$<2.0 \times 10^{-4}$ *
Acetic Acid	0°C (32°F) 25°C (77°F)	0.005* 0.00112*	Bromoform	25°C (77°F)	$<0.02$ *
Acetic Anhydride	0°C (32°F) 25°C (77°F)	1.0* 0.48*	ISO-Butyl Alcohol	25°C (77°F)	$<0.02$ *
Acetone	18°C (64°F) 25°C (77°F)	0.02* 0.06*	Capronitrile	25°C (77°F)	3.7*
Acetonitrile	20°C (68°F)	7.0	Carbon Disulfide	1°C (34°F)	$7.8 \times 10^{-12}$ *
Acetophenone	25°C (77°F)	0.006*	Carbon Tetrachloride	18°C (64°F)	$4.0 \times 10^{-12}$ *
Acetyl Bromide	25°C (77°F)	2.4*	Chlorine	-70°C (-94°F)	$<1 \times 10^{-10}$ *
Acetyl Chloride	25°C (77°F)	0.4*	Chloroacetic Acid	60°C (140°F)	1.4*
Alizarin	233°C (451°F)	1.45*	M-Chloroaniline	25°C (77°F)	0.05*
Allyl Alcohol	25°C (77°F)	7.0	Chloroform	25°C (77°F)	$<0.02$ *
Ammonia	-79°C (-110 °F)	0.13*	Chlorohydrin	25°C (77°F)	0.5*
Aniline	25 °C (77°F)	0.024*	M-Creosol	25°C (77°F)	$<0.017$ *
Anthracene	230°C (446°F)	0.0003*	Cyanogen	—	$<0.007$ *
Arsenic Tribromide	35°C (95°F)	1.5*	Cymene	25°C (77°F)	$<0.02$ *
Arsenic Trichloride	25°C (77°F)	1.2*	Dichloroacetic Acid	25°C (77°F)	$<0.07$ *
Benzaldehyde	25°C (77°F)	0.15*	Dichlorohydrin	25°C (77°F)	12
Benzene	—	0.076*	Diethyl Carbonate	25°C (77°F)	0.017*
Benzoic Acid	125°C (257°F)	0.003*	Diethyl Oxalate	25°C (77°F)	0.76*
Benzonitrile	25°C (77°F)	0.05*	Diethyl Sulfate	25°C (77°F)	0.26*
Benzyl Alcohol	25°C (77°F)	1.8*	Diethylamine	-33.6°C (-29°F)	0.0022*
Benzyl Benzoate	25°C (77°F)	$<0.001$ *	Dimethyl Sulfate	0°C (32°F)	0.16*
Benzylamine	25°C (77°F)	$<0.0017$ *	Epichlorohydrin	25°C (77°F)	0.034*
			Ethyl Acetate	25°C (77°F)	$<0.001$ *

\* If asterisk is noted against conductivity value, it denotes that the value may be too low for the magnetic flowmeter. Refer to the particular flowmeter specification for minimum allowable conductivity.

\*\* The temperatures listed may be beyond the limits of the flowtube. Check applicable flowtube specifications for process temperature limits.

Table 2. Electrical Conductivity of Pure Liquids (Continued)

Name of Pure Liquid	Value Listed at Temperature of**	Conductivity in $\mu\text{S/cm}$	Name of Pure Liquid	Value Listed at Temperature of**	Conductivity in $\mu\text{S/cm}$
Ethyl Acetoacetate	25°C (77°F)	0.04*	Hydrogen Bromide	-80°C (-112°F)	0.008*
Ethyl Alcohol	25°C (77°F)	0.0013*	Hydrogen Chloride	-96°C (-140°F)	0.01*
Ethyl Benzoate	25°C (77°F)	0.001*	Hydrogen Cyanide	0°C (32°F)	3.3*
Ethyl Bromide	25°C (77°F)	0.02*	Hydrogen Iodide	Boiling Point	0.2*
Ethyl Ether	25°C (77°F)	$4 \times 10^{-7*}$	Hydrogen Sulfide	Boiling Point	$10^{-5*}$
Ethyl Iodide	25°C (77°F)	<0.02*	Iodine	110°C (230°F)	$1.3 \times 10^{-4*}$
Ethyl Isothiocyanate	25°C (77°F)	0.126*	Kerosine (ene)	25°C (77°F)	<0.017*
Ethyl Nitrate	25°C (77°F)	0.53*	Mercury	0°C (32°F)	$10.6 \times 10^9$
Ethyl Thiocyanate	25°C (77°F)	1.2*	Methyl Acetate	25°C (77°F)	3.4*
Ethylamine	0°C (32°F)	0.4*	Methyl Alcohol	18°C (64°F)	0.44*
Ethylene Bromide	19°C (66°F)	$<2.0 \times 10^{-4*}$	Methyl Ethyl Ketone	25°C (77°F)	0.1*
Ethylene Chloride	25°C (77°F)	0.03*	Methyl Iodine	25°C (77°F)	<0.02*
Ethylidene Chloride	25°C (77°F)	<0.017*	Methyl Nitrate	25°C (77°F)	4.5*
Eugenol	25°C (77°F)	<0.017*	Methyl Thiocyanate	25°C (77°F)	1.5*
Formamide	25°C (77°F)	4.0*	Naphthalene	82°C (180°F)	$4 \times 10^{-4*}$
Formic Acid	18°C (64°F) 25°C (77°F)	56.0 64.0	Nitrobenzene	0°C (32°F)	$5 \times 10^{-3*}$
Furfural	25°C (77°F)	1.5*	Nitromethane	18°C (64°F)	0.6*
Gallium	30°C (86°F)	$36.8 \times 10^9$	O-OR M-Nitrotoluene	25°C (77°F)	<0.2*
Germanium Tetrabromide	30°C (86°F)	78.0	Nonane	25°C (77°F)	<0.017*
Glycerol	25°C (77°F)	0.064*	Oleic Acid	15°C (59°F)	$<2 \times 10^{-4*}$
Glycol	25°C (77°F)	0.3*	Pentane	19.5°C (67°F)	$<2 \times 10^{-4*}$
Guaiacol	25°C (77°F)	0.28*	Petroleum	—	$3 \times 10^{-7*}$
Heptane	—	$<10^{-7*}$	Phenetole	25°C (77°F)	<0.017*
Hexane	18°C (64°F)	$<10^{-12*}$	Phenol	25°C (77°F)	<0.017*

\* If asterisk is noted against conductivity value, it denotes that the value may be too low for the magnetic flowmeter. Refer to the particular flowmeter specification for minimum allowable conductivity.

\*\* The temperatures listed may be beyond the limits of the flowtube. Check applicable flowtube specifications for process temperature limits.

Table 2. Electrical Conductivity of Pure Liquids (Continued)

Name of Pure Liquid	Value Listed at Temperature of**	Conductivity in $\mu\text{S/cm}$	Name of Pure Liquid	Value Listed at Temperature of**	Conductivity in $\mu\text{S/cm}$
Phenyl Isothiocyanate	25°C (77°F)	1.4*	Salicylaldehyde	25°C (77°F)	0.16*
Phosgene	25°C (77°F)	0.007*	Stearic Acid	80°C (176°F)	$<4 \times 10^{-7*}$
Phosphorus	25°C (77°F)	0.4*	Sulfonyl Chloride	25°C (77°F)	2.0*
Phosphorus Oxychloride	25°C (77°F)	2.2*	Sulfur	115°C (239°F) 130°C (266°F) 440°C (824°F)	$10^{-6*}$ $5.0 \times 10^{-5*}$ 0.12*
Pinene	23°C (73°F)	$<2 \times 10^{-4*}$	Sulfur Dioxide	35°C (95°F)	0.015*
Piperidine	25°C (77°F)	0.2*	Toluene	—	$<10^{-8*}$
Proionaldehyde	25°C (77°F)	0.85*	O-Toluidine	25°C (77°F)	$<2.0^*$
Propionic Acid	25°C (77°F)	$<10^{-3*}$	P-Toluidine	100°C (212°F)	0.062*
Propionitrile	25°C (77°F)	0.1*	Trichloroacetic Acid	25°C (77°F)	0.003*
M-Propyl Alcohol	18°C (64°F) 25°C (77°F)	0.05* 0.02*	Trimethylamine	-33.5°C (-28°F)	$2.2 \times 10^{-4*}$
ISO-Propyl Alcohol	25°C (77°F)	3.5*	Turpentine	~	$2.0 \times 10^{-7*}$
M-Propyl Bromide	25°C (77°F)	$<0.02^*$	ISO-Valeric Acid	80°C (176°F)	$<4.0 \times 10^{-7*}$
Pyridine	18°C (64°F)	0.053*	Water (Distilled)	—	0.04*
Quinoline	25°C (77°F)	0.022*	Xylene	—	$<10^{-9*}$

\* If asterisk is noted against conductivity value, it denotes that the value may be too low for the magnetic flowmeter. Refer to the particular flowmeter specification for minimum allowable conductivity.

\*\* The temperatures listed may be beyond the limits of the flowtube. Check applicable flowtube specifications for process temperature limits.

Table 3. Electrical Conductivity of Miscellaneous Liquids

Name of Pure Liquid	Value Listed at Temperature of**	Conductivity in $\mu\text{S/cm}$	Name of Pure Liquid	Value Listed at Temperature of**	Conductivity in $\mu\text{S/cm}$
Acintol P	75°C (167°F)	0.7*	Formaldehyde 44%	38°C (100°F)	175
Actol 31-56 Trial	25°C (77°F)	0.77*	Fudge	57°C (135°F)	46
Adipic Acid	170°C (338°F)	0.20*	Fuel Oil	—	$<10^{-7*}$
Adipic Acid	25°C (77°F)	0.7*	Gin 90 Proof	25°C (77°F)	10
Alphonic	80°C (176°F)	0.5*	Hydraulic Fluid	—	$<10^{-7*}$
Alum	25°C (77°F)	9000	Hydrogen Peroxide 90%	60°C (140°F)	2*
Aluminum Chloride	25°C (77°F)	250 000	Ink	93°C (199°F)	$<10^{-7*}$
Alumina Hydrate Solution	25°C (77°F)	350 000	Isophthalic Polyester Resin	25°C (77°F)	$<0.04^*$
Animal Fat	70°C (158°F)	$<10^{-7*}$	Isopropanol	25°C (77°F)	1.8*
Asphalt Emulsion	30°C (86°F)	9000	Lactan	25°C (77°F)	43
Black Liquor	93°C (199°F)	5000	Lard	—	$<10^{-7*}$
Carbamate	25°C (77°F)	400	Latex	25°C (77°F)	1750
Carboxylic Acid	25°C (77°F)	5	Latex Paint	25°C (77°F)	700
Chemonite	25°C (77°F)	5000	Methy Isobutyl Ketone	25°C (77°F)	4*
Chlorinated Ether	25°C (77°F)	18	Molasses	10°C (50°F) 50°C (122°F)	300 5000
Chocolate Liquor	—	$<10^{-7*}$	Oleum 20%	25°C (77°F)	500
Coca Cola Syrup	20°C (68°F)	600	Oxygen	—	$<10^{-7*}$
Coffee Extract	84°C (183°F)	5000	Parafin Wax	66°C (150°F)	$<10^{-7*}$
Corn Syrup	32°C (90°F)	16	Paint, Enamel	25°C (77°F)	$<10^{-7*}$
Cranberries Crushed	38°C (100°F)	26	Peanut Butter	93°C (199 °F)	$<10^{-7*}$
Cream Cheese Mix	79°C (174°F)	5000	Polystyrene	54 °C (129°F)	1200
Diofan 190D (55%)	25°C (77°F)	6000	Propylene Glycel	25°C (77°F)	0.04*
			Pyresote	25°C (77°F)	11 000
			Royal Crown Cola Syrup	25°C (77°F)	600

\* If asterisk is noted against conductivity value, it denotes that the value may be too low for the magnetic flowmeter. Refer to the particular flowmeter specification for minimum allowable conductivity.

\*\* The temperatures listed may be beyond the limits of the flowtube. Check applicable flowtube specifications for process temperature limits.

Table 3. Electrical Conductivity of Miscellaneous Liquids (Continued)

Name of Pure Liquid	Value Listed at Temperature of**	Conductivity in $\mu\text{S/cm}$	Name of Pure Liquid	Value Listed at Temperature of**	Conductivity in $\mu\text{S/cm}$
Sodium Aluminate	25°C (77°F)	70 000	Titanium Dioxide	25°C (77°F)	4000
Sodium Silicate (37%)	25°C (77°F)	26 000	Toothpaste	25°C (77°F)	150
Sodium Silicate (40%)	25°C (77°F)	24 000	Urea (Pure)	145°C (293°F)	5000
Sodium Silicate (46%)	25°C (77°F)	14 000	Urea (66%)	25°C (77°F)	100
Soybean Oil	104°C (219°F)	<10 <sup>-7*</sup>	Vegetable Oil	25°C (77°F)	<10 <sup>-7*</sup>
Soybean Oil	25°C (77°F)	<0.04*	Vodka 100 Proof	25°C (77°F)	4*
Starch	27°C (81°F)	3000	Uranium Sulfate Extract	38°C (100°F)	3000
Sugar Solution Dilute	30°C (86°F)	585	Water, New York City	25°C (77°F)	72
Sugar Solution Pure	10°C (50°F)	3.0*	Water, Distilled	—	0.04*
			Zinc Oxide	25°C (77°F)	2000

\* If asterisk is noted against conductivity value, it denotes that the value may be too low for the magnetic flowmeter. Refer to the particular flowmeter specification for minimum allowable conductivity.

\*\* The temperatures listed may be beyond the limits of the flowtube. Check applicable flowtube specifications for process temperature limits.

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