SWITCHBOARD INSTRUMENT SELECTOR GUIDE

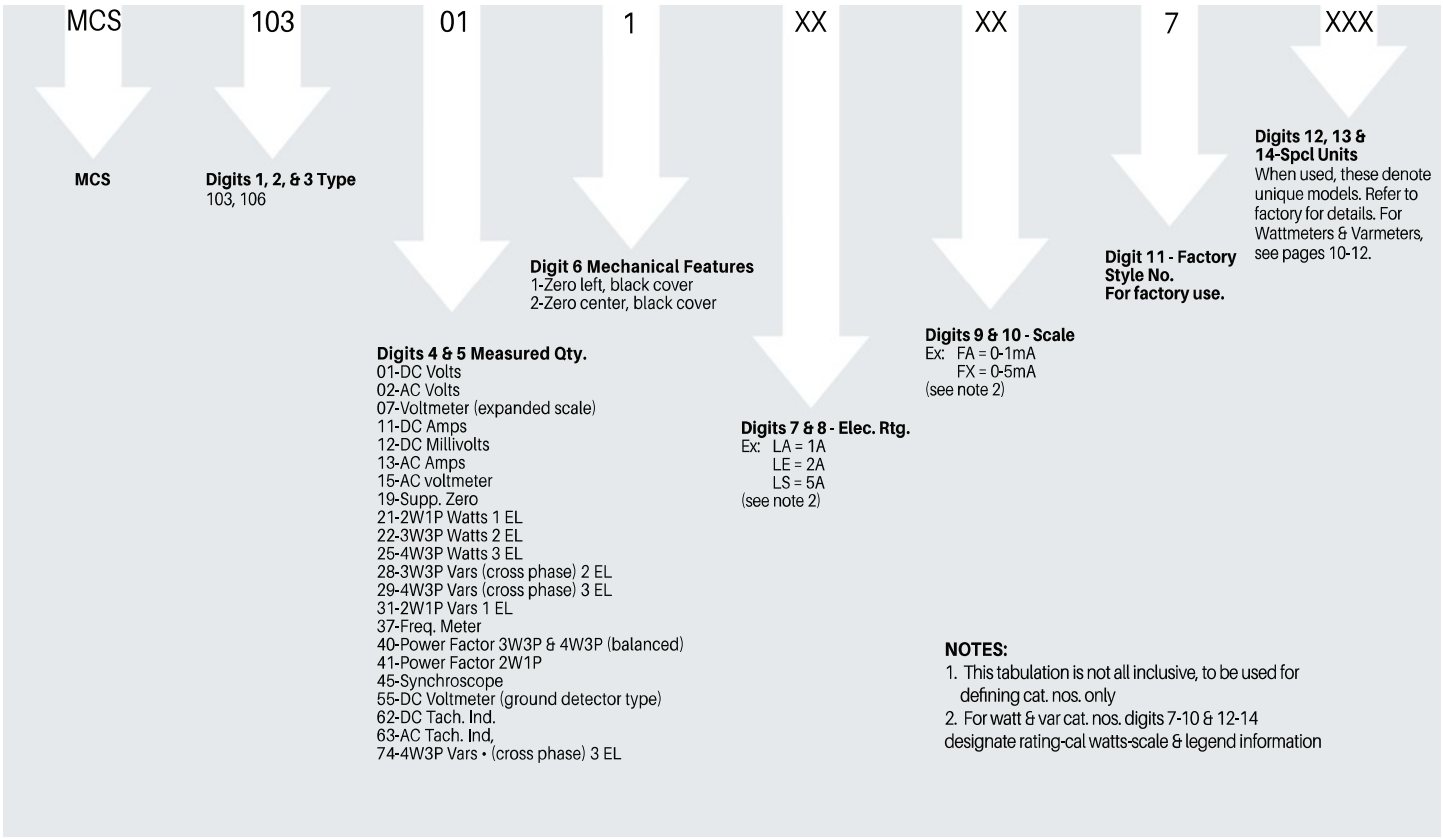
Model Type	MCS
Case Style	4¼" Metal
Available	
Input Rating	
AC Milliamperes	X
AC Amperes	X
AC Voltage	X
DC Microamperes	X
DC Milliamperes	X
DC Amperes	X
DC Millivolts	X
DC Voltage	X
Frequency	X
AC Watts	X
AC VARS	X
Power Factor	X
AC Synchroscope	X
RPM Indicator	X
Process Indicator	X

MCS Switchboard specifications in accordance with ANSI C39.1

Accuracy: ±1.0% of full scale basic accuracy class.
Specific accuracies:
Expanded Scale Voltmeter - 0.3% of mid-scale.
Power factor meter - ±1% of fiducial value from 40-120% of rated current.
Synchroscope - ±1% of scale length.
Frequency meters - ± .15Hz @45-55Hz and 55-65Hz, ±0.08Hz 58-62Hz, ±1.3Hz @350-450Hz.
Position of use: Vertical (scale)
Full scale deflection angle: 250°, except synchroscope is 360°
Full scale length: MCS - 6.9 inches.
Scale plate: MCS platform type 2 piece scale with graduations on the outer scale; numerals and legends on the inner scale.
Case: All MCS switchboard instruments have drawn steel case with matt black powder coating.
Cover: Front cover has bezel & window made by one piece of flame retardant Polycarbonate molding with black matte finished bezel area.
Mounting studs: 1/4" x 28 thread.
Terminal studs: 10-32 thread.
Operating temperature range: 0 to 40°C (32 to 104°F).
Storage temperature range: -10 to 50°C (14 to 122°F).
Extreme temperature range: -20°C to 65°C (-4 to 149°F).
Dielectric level: 2300VAC for 1 minute between the electrical circuit and mounting studs.
Overload rating: AC & DC Ammeters – 1.2 x continuous, 10 x for 0.5 seconds, repeated 10 times with 1 minute interval.
Ac & DC Voltmeters and frequency meters – 1.2 x continuous
Response time: 3 seconds maximum

Ordering System

Key to MCS Switchboard Numbering System (See Notes)



NOTES:
1. This tabulation is not all inclusive, to be used for defining cat. nos. only
2. For watt & var cat. nos. digits 7-10 & 12-14 designate rating-cal watts-scale & legend information

How to Order - Specify the following:

1. Complete Part Number or Ordering number or;
2. Provide significant portion of catalog number with word description for differences (e.g. "Similar to MCS103111FAFA, except scale 0-100 kilovars"), or;
3. Provide word description including the following information:

Type: MCS
Rating (Input):.....Amperes AC or DC.....
Volts AC or DC.....
Frequency: 60 Hz, 50 Hz, 400 Hz.....Hz
Scale: Min. Value - Max. Value, Zero left,
Zero-center or offset zero
Legend: Specify words and/or symbols exactly
Potential Transformer Ratio: .....to 120 volts
or.....to.....volts
Current Transformer Ratio:.....to 5 amperes
or .....to .....amperes
Circuit: 2-wire/single-phase, 3-wire/3 phase.
3-phase/4-wire.....other
External Devices; phase Shifting transformers, shunts
transducers, etc .....
Other Options:.....
Special features .....

Shipping & Storage Weights

Instrument		MCS Net (lbs)	MCS Net kg	MCS Ship (lbs)	MCS Ship kg
DC-A/V		1.5	.70	2.4	1.1
AC	V	1.7	.79	2.7	1.2
	A	1.8	.84	2.7	1.2
WATT/VAR	1Ø	2.8	1.3	3.6	1.7
	3Ø3W 3Ø4W	3.0	1.4	3.9	1.8
Power Factor		2.0	.95	3.0	1.4
Frequency		1.8	.82	2.7	1.2
Tachometer		1.6	.80	2.7	1.2
Synchroscope		3.9	1.8	4.8	2.2

Approximate Package Size in Inches / Centimeters

All MCS .....6x 6x 11/15x 15 x 28
Shipping .....7x 7 x 13/18 x 18 x33

POWER FACTOR SCALE FOR BALANCED SYSTEM

Power Factor Meters

Rating (Amperes)	Rating (L-L Volts)	Scale	Part Number	Ordering Number
Single-Phase/2-Wire, 60Hz				
5	120	.5-1-.5	MCS 103 412 FCAD	1D0078
3-Phase 3- & 4-Wire, 50/60Hz Balanced System Only				
5	120	.5-1-.5	MCS 103 402 FCAD	1D0079
5	208	.5-1-.5	MCS 103 402 FDAD	1D0080
5	240	.5-1-.5	MCS 103 402 FEAD	1D0081
5	480	.5-1-.5	MCS 103 402 FFAD	1D0082

Frequency Meters, 120V

Scale (Hz)	Center Frequency (Hz)	Accuracy (Hz)	Part Number	Ordering Number
45-55	50	±0.15	MCS 103 372 AGAG	1D0084
45-65	55	±0.25	MCS 103 372 AJAJ	1D0085
48-52	50	±0.08	MCS 103 372 AKAK	1D0086
50-70	60	±0.25	MCS 103 372 ALAL	1D0087
55-65	60	±0.15	MCS 103 372 ANAN	1D0088
58-62	60	±0.08	MCS 103 372 ATAT	1D0089
59-61	60	±0.047	MCS 103 372 ASAS	1D0090
350-450	400	±1.3	MCS 103 372 BHBH	1D0091
390-410	400	±0.492	MCS 103 372 BLBL	1D0092

Synchroscopes-Pivot & Jewel, 120 Volt

Scale	Normal Frequency	Part Number	Ordering Number
"Slow-Fast"	50	MCS 106 452 ABAA	1D0093
"Slow-Fast"	60	MCS 106 452 AAAA	1D0094

Synchroscopes-Digital, 120 Volt, Relay

Scale	Normal Frequency	Part Number	Ordering Number
Volts, Frequency & Phase Angle	50 - 60	MCS 106 452 DIGITAL	1C9844

Burden Data - AC Meters

Type	Impedance in Ohms	Dielectric withstand	Overload rating	Volt – ampere	Power Factor
For Potential circuit					
AC Voltmeter	45.5 Kohms @ 120VAC	2300VAC between electronic circuit and case for 1 minute	X1.2 continuous	< 0.8 VA @ 150V	--------
AC Wattmeter or Var meter	For 3 phase 3 wire Wattmeter 316 K ohm @ 110V For 3 Phase 3 wire Var Meter 273.4 Kohm @ 110V	2600VRMS between electronic circuit and case for 1 minute	Voltage X 2 rating for 5 second Voltage x 1.2 continuous	< 4.5VA for Voltage circuit	1.0
AC Power Factor Meter	For 1 phase PF meter 95.2 K ohm @ 110V For 3 phase PF meter 124.9Kohm @ 415V	2600VRMS between electronic circuit and case for 1 minute	Voltage X 2 rating for 5 second Voltage x 1.2 continuous	< 4.5 VA for Voltage circuit	1.0
Frequency Meter	> 1 Mohm	2300VAC between electronic circuit and case for 1 minute	--------	--------	--------
Synchroscope	TBD	TBD	TBD	TBD	TBD
For Current circuit					
AC Ammeter	0.005 ohms @ 10A	2300VAC between electronic circuit and case for 1 minute	X2 continuous, X 10 for 1 second	< 0.5 VA	--------
AC Wattmeter or Var meter	For 3 phase 3 wire Wattmeter 0.1 ohm @ 1A For 3 Phase 3 wire Var Meter 0.1ohm @ 1A	2600VRMS between electronic circuit and case for 1 minute	Current X10 rating for 5 second, Current X 1.2 continuous	< 2 VA for Current circuit	1.0
AC Power Factor Meter	For 3 phase 3 wire Wattmeter 0.1 ohm @ 1A For 3 Phase 3 wire Var Meter 0.1ohm @ 1A	2600VRMS between electronic circuit and case for 1 minute	Current X10 rating for 5 second, Current X 1.2 continuous	< 2 VA for Current circuit	1.0

*Data based on a per-element basis

Burden Data - DC Meters

DC Voltmeters

Rating (Volts)	Sensitivity (Ohms Per Volt)
50mV – 800V	1,000 ohms / volt for left zero and 2,000 ohms / volt for centre zero

Rating (mV)	Calibrated for 2-way Lead Resistance of 0.04 Ohms as standard**	Ohms Terminal Resistance ± 15%
0-50	0.04	12.50 ohm
50-0-50	0.04	25.0 ohm
0-100	0.04	25.0 ohm
100-0-100	0.04	50 ohm

DC Microammeters

Rating (uA)	Ohms Terminal Resistance ± 15%
0-200	10 Kohm
0-400	2.52 Kohm
0-500	2.5 Kohm

DC Milliammeters / Ammeter

Current Rating	Ohms Terminal Resistance ± 15%
0 - 1 mA	500 ohm
0 - 5 mA	7 ohm
0 – 15 mA	3 ohm
0 – 1 A	0.075 ohm