

Loop Powered Temperature Transmitter with Display TT7S10-D/TT7S10-XP



Masibus Automation and Instrumentation Pvt. Ltd.

SPECIFICATION

INPUT	
Input Type	
RTD:	PT100 3/4-WIRE
Resistance/Potentiometer:	0 to 2500Ω
T/C:	E,J,K,T,B,R,S,N with internal CJC (ANSI standard)
LINEAR:	0 to 75mv/500mVDC, 0/4-20 mA
RTD/Resistance/Potentiometer excitation Current	~0.2 mA
Input Impedance for V Input	≥ 1M ohms
Input Burden for mA Input	≤ 1V
Sensor Break current	<1 uA
Input Range	Refer Table-1.1
Zero & Span Adjust	Adjustable either from Keyboard or from mTRAN Software
Accuracy	±0.1% Full Span, ± 1 Degree for E, J, K, T, N, PT100. ±0.25% Full Span, ± 1 Degree for B, R, S. ±0.1% Full Span, ± 1 Unit for Linear, mA and Potentiometer input.
CJC Error	±2 °C for E, J, K, T, N TC & ±3 °C for B, R, S TC
ADC Resolution	16bit
Stability	±0.1% per year
Response time	< 1Sec approx., if filter is set to 0. (Input to Output)
Digital Filter	0-20 settable through software (2 default)
Sensor open Detection	Available (Not Applicable on 0-20mA)
Allowable wiring resistance for RTD	Maximum 15 ohms/wire (Resistance between all wires should be equal)
CMRR	>120 dB
NMRR	~40 dB
Temp-co	< 150ppm

OUTPUT

Current Output (2-Wire)	4-20mA or 20-4mA (User programmable ,Scaled by OPL0 and OPH1)
Output Accuracy	± 0.25% of Full Span
Sensor break Output	≤ 3.8 or ≥20.8mA programmable.
Output load	R load = (V supply - 11.5)/0.021 Ohm For TT7S10-D R load = (V supply - 13.5)/0.021 Ohm For TT7S10-XP Single/Dual Compartment

DISPLAY & KEYS

	TT7S10-D	TT7S10-XP (Single - Compartment)	TT7S10-XP (Dual - Compartment)
Display Size	0.3"	0.56"	0.39"
Display Type	7 Segment, Red LED, 4 Digit		
Keys	3 keys (ENT, ESC, INC) for configuration, calibration and Operation		

COMMUNICATION

Interface	TTL(3 Wire)
Protocol	Modbus-RTU
Slave ID	1
Baud rate	9600 bps

POWER SUPPLY

Power supply	TT7S10-D : 11.5-36 VDC - 2 Wire TT7S10-XP Single/Dual Compartment: 13.5-36 VDC - 2 Wire
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ISOLATION

Isolation Level	1500Vrms for 1 minute between input & output
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PHYSICAL

	TT7S10-D	TT7S10-XP (Single - Compartment)	TT7S10-XP (Dual - Compartment)
Mounting	DIN Rail Mount (35mm)	Wall (Std) or 2" Pipe mount (optional)	Wall (Std) or 2" Pipe mount (optional)
Dimensions in mm	75(H) x 35(W) x 107.25(D)	140(H) x 145(W) x 80(D)	100(H) x 100(W) x 145(D)
Weight (without mounting clamps)	~250g	~1 Kg	~1.65 Kg
Enclosure Material	ABS	Aluminium Alloy LM-6	
Ingress Protection	IP20	IP65	IP66
Area Classification	Safe	Zone 1 & 2, Gas Group: IIA & IIB	
Cable entry size	NA	2 nos of 3/4" ET double compression cable glands	

ENVIRONMENTAL

Operating temperature	TT7S10-D: 0 to 55 °C TT7S10-XP Single/Dual Compartment: 0 to 80°C
Storage temperature	-20 to 85 °C
Humidity	30% to 95% RH(Non-condensing)

Table-1.1

Input	Input Type	Range
Thermocouple	E	-200 to 1000°C
	J	-200 to 1200°C
	K	-200 to 1370°C
	T	-200 to 400°C
	B	450 to 1800°C
	R	0 to 1750°C
	S	0 to 1750°C
	N	-200 to 1300 °C
RTD	PT100 3/4 Wire	-200 to 850 °C
Linear V	0 to 75mV / 0 to 500mV DC	-1999 to 9999
Linear mA	0 to 20mA / 4 to 20mA	-1999 to 9999
Resistance/Potentiometer	0 to 2500Ω	-1999 to 9999

ORDERING CODE

Model	Input Type	
TT7S10-D	x	
	1	E
	2	J
	3	K
	4	T
	5	B
	6	R
	7	S
	8	N
	9	Pt-100
	C	4-20mA
	D	0-20mA
	U	0-75mV DC
	H	0-500mV DC
	I	0-2500Ω

Model	Input Type		Mounting & Compartment Type	
TT7S10-XP	x		x	
	1	E	SW	Wall Mount Single Compartment
	2	J	SP	Pipe Mount Single Compartment
	3	K	DW	Wall Mount Dual Compartment
	4	T	DP	Pipe Mount Dual Compartment
	5	B		
	6	R		
	7	S		
	8	N		
	9	PT100		
	C	4-20mA		
	D	0-20mA		
	U	0-75mV		
	H	0-500mV		
	I	0-2500Ω		

SAFETY/WARNING PRECAUTIONS

To ensure that the device can be operated safely and all functions can be used, please read these instructions carefully. Installation and Start-up must be carried out by qualified personnel only. The relevant country-specific regulations must also be observed. Before start-up it is particularly important to ensure:

- Terminal wiring: check that all cables are correctly connected according to the connection diagram
- All wiring must confirm to appropriate standards of good practice and local codes and regulations. Wiring must be suitable for voltage, current and temperature rating of the system.
- Unused control terminals should not be used as jumper points as they may be internally connected, which may cause damage to the unit.

WARRANTY

Warranty does not apply to defects resulting from action of the user such as misuse, improper wiring, operation outside of specification, improper maintenance or repair, or unauthorized modification.

Masibus is not liable for special, indirect or consequential damages or for loss of profit or for expenses sustained as a result of a device malfunction, incorrect application or adjustment.

Masibus’ total liability is limited to repair or replacement of the product. The warranty set forth above is inclusive and no other warranty, whether written or oral, is expressed or implied.

MECHANICAL INSTALLATION AND REMOVAL

Place the module with the DIN rail guide way on the bottom edge of the DIN rail and then snap it downwards. The housing is mounted on the DIN rail by swivelling it into place. As air vents are provided on the top and bottom part of the unit, the (horizontal) mounting arrangement allows good vertical air circulation.

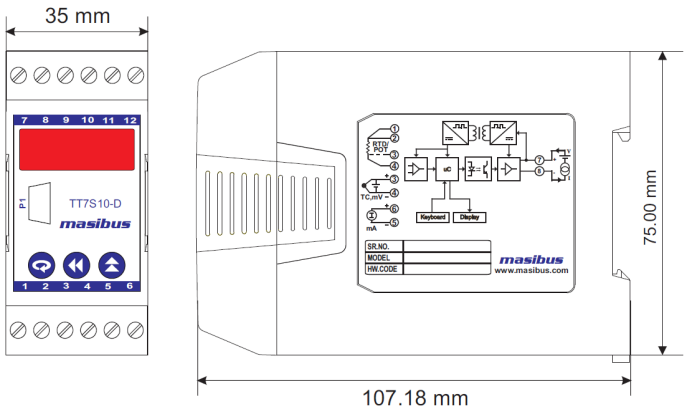


Vertical mounting arrangement of multiple units must be avoided.

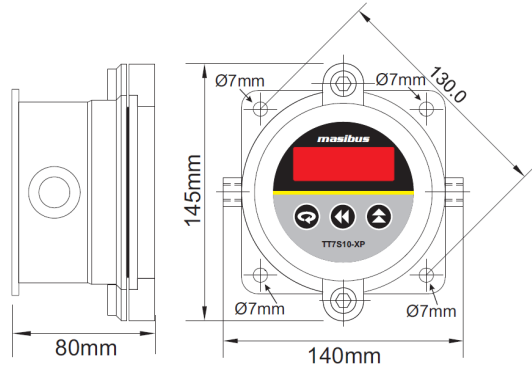
Release the Snap-On catch using a correct screwdriver and then detach the module from the bottom edge of the DIN Rail to Remove Instrument from DIN Rail.

OVERALL DIMENSIONS (In mm)

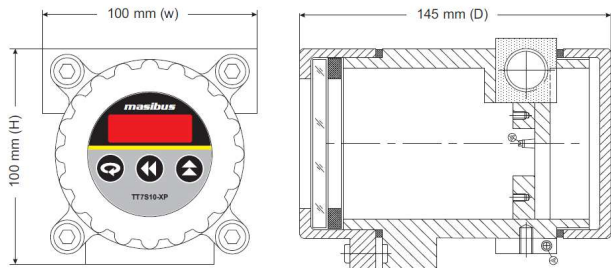
TT7S10-D



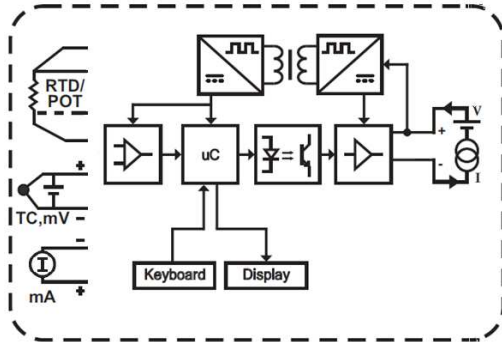
TT7S10-XP (Single Compartment)



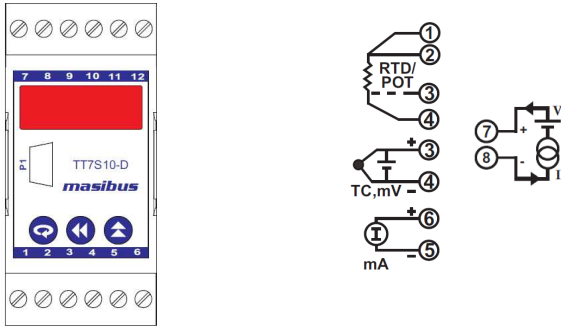
TT7S10-XP (Dual Compartment)



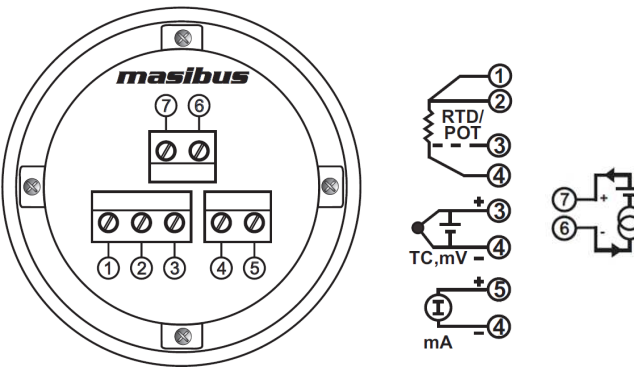
BLOCK DIAGRAM



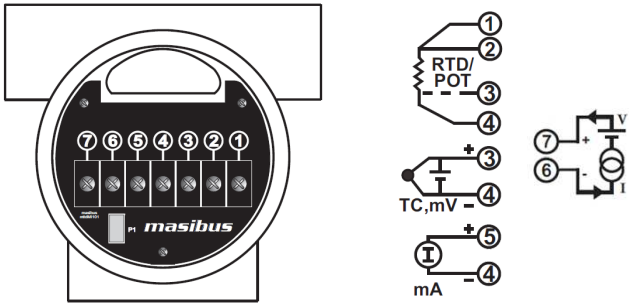
TT7S10-D Terminal Connection



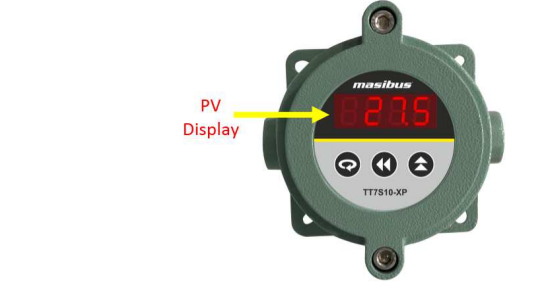
TT7S10-XP Single Compartment Terminal Connection



TT7S10-XP Dual Compartment Terminal Connection



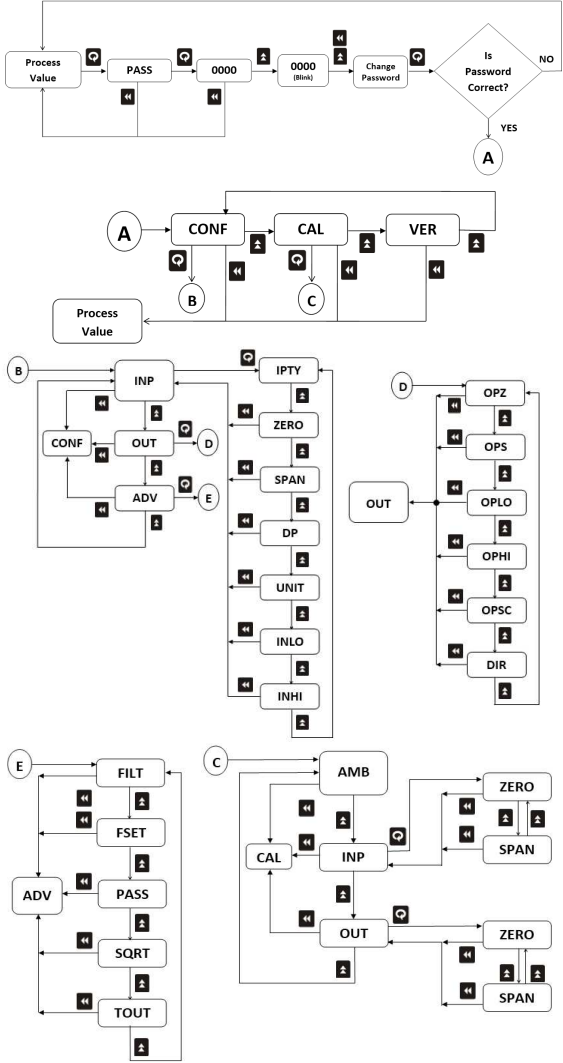
PARAMETER SETTINGS



- ENT KEY
- ESC/SHIFT KEY
- UP/INC KEY

For Thermocouple input type, Press key to read device ambient temperature in RUN mode.

Menu Layout for TT7S10-D/ TT7S10-XP.



Menu Parameter Description

Display	Name	Description
PASS (PRSS)	PASSWORD	If user enters the correct password, user can configure or calibrate the device. If wrong password is entered, device goes to run mode again and shows PV Value.
CONF (CONF)	Configuration Mode	To Enter in to Configuration Mode to Configure the parameters of Instrument.
CAL (CAL)	Calibration Mode	To Enter in Calibration Mode to Calibrate the Instrument.
VER (VER)	Version	Shows the Version of the Current Firmware.
INPT (INPT)	Input	For Input Parameters. In Conf mode, user can set input Configuration and in Cal mode, user can calibrate input.
OPT (OPT)	Output	For Output Parameters. In Conf mode, user can set Output Configuration and in cal mode, user can calibrate output.
ADV (ADV)	Advance	To configure advanced parameters shown in menu layout Section "E".
ZERO (ZERO)	Zero (Conf. mode)	Can be set to any value within the Input Range & less than SPAN Value. Value of Zero must be less than Span Value by 10.
SPAN (SPAN)	Span (Conf. mode)	Can be set to any value within the Input Range & greater the ZERO Value. Value of Span must be greater than Zero Value by 10.
UNIT (UNIT)	Unit	Configure the Engineering Unit for Process Input Value only for TC/RTD (°C, °F, °K).
INLO (INLO)	InLO	Used for Input Low and Hi Value Select. INHI - INLO >10. Applicable for Linear/POT Input Type.
INHI (INHI)	InHI	
DP (DP)	Decimal Point	To Set position of Decimal Point on Process Value. Applicable for Linear/POT Input Type.
OP Z (OP Z)	Output Zero	% of Output for scaling. O/P Zero limit will be limited to 0-30% of O/P Span value.
OP S (OP S)	Output Span	% of Output for scaling. O/P Span limit will be limited to 70-100% of O/P Span value.
OPLO (OPLO)	Output Lo	O/P Low value limit will be limited between 0-25% of O/P Span value. Output will not be scaled but will be limited to configured % of output.
OPHI (OPHI)	Output HI	O/P Hi value limit will be limited between 75-100 % of O/P Span value. Output will not be scaled but will be limited to configured % of output.
OPSC (OPSC)	OPEN Sensor Indication	To set O/P to either Upscale or Downscale when Input is OPEN.(Not applicable for 0-20mA)
DIR (DIR)	Output Direction	To set Retransmission O/P Direction to either Direct or Reverse.
FILT (FILT)	Filter	To set Digital filter for PV Value (0 to 20). The value of Filter will determine the ability of filtering noise. When a large value is set, the measurement of input is stabilized but the response speed is slow. When the device is under examination at laboratory, "FILT" should be set to 0 or 1 to shorten the response time.
FSET (FSET)	Factory Reset	To retrieve the factory setting.
PASS (PRSS)	Change Password	To change the Password of device to Enter in Configuration/Calibration Mode.
SQRT (SQRT)	Square Root	Applicable for Linear/POT Input with Options of YES or NO. By using Square Root, Output will be displayed as per equation "PV = SQRT [{(input reading -config. IP Zero)/ (config. IP Span -config. IP Zero)} * Config.OP Span] + Config. OP Zero."
TOUT (TOUT)	Timeout	Time Setting to Return in RUN mode while no key operation. Timeout Range is between 10 to 300 seconds.
AMB (AMB)	Ambient Calibration	To Calibrate the Ambient Temperature. Applicable only if TC input Type is selected.
ZERO (ZERO)	Zero (Cal. mode)	To Calibrate the Input/output Zero.
SPAN (SPAN)	Span (Cal. mode)	To Calibrate the Input/output Span.

MODBUS Parameters Details:

Analog Parameters	Address	Type of Access	Parameter Type	Values Applicable
Ambient Temperature	30001	Read	Int	-
Process value	30002	Read	Int	-
Input type	40001	Read/write	Int	1-12, 16, 26, 27
AMB calibration value	40002	Read/write	Int	100 - 3532
Zero calibration of Input Value	40003	Read/write	Int	As per Table 1.2
Span calibration of Input Value	40004	Read/write	Int	As per Table 1.2
Zero calibration of retransmission (4 mA)	40005	Read/write	Int	3000-5000
Span calibration of retransmission (20 mA)	40006	Read/write	Int	19000-21000
I/P Zero	40007	Read/write	Int	As per Input Range
I/P Span	40008	Read/write	Int	As per Input Range
Direction for RTR OP	40009	Read/write	Int	1 - 2
Open sensor for RTR OP	40010	Read/write	Int	1 - 2
Reserved	40011	Read/write	Int	N/A

Digital filter	40012	Read/write	Int	0-20
Output Calibration Mode Entering(Zero Calibration(1),Span Calibration(2),Exit-Run Mode(3))	40013	Read/write	Int	1-3
Engineering Units	40014	Read/write	Int	1 To 3
Factory Reset	40015	Read/write	Int	1-2
O/P Lo (% of O/P Zero range) for O/P1	40016	Read/write	Int	0-25
O/P High (% of O/P Span range) for O/P1	40017	Read/write	Int	75-100
O/P Z (% of O/P Zero) of O/P 1 for scaling	40018	Read/write	Int	0-30
O/P S (% of O/P Span) of O/P 1 for scaling	40019	Read/write	Int	70-100
I/P Lo	40020	Read/write	Int	-1999 To 9999
I/P Hi	40021	Read/write	Int	-1999 To 9999
Square root	40022	Read/write	Int	1-2
Decimal Point	40023	Read/write	Int	0 - 3

40001. I/P type

1. E-TC
2. J-TC
3. K-TC
4. T-TC
5. B-TC
6. R-TC
7. S-TC
8. N-TC
9. RTD-3W
10. 0-500mV
11. 0-75mV
12. POT 2.5K
16. RTD-4W
26. 4-20 mA
27. 0-20 mA

40013.Output Calibration Mode

1. Zero Cal
2. Span Cal
3. Exit

40014. Engineering Units

1. DEGC
2. DEGF
3. DEKG

40015. Factory Reset

1. No
2. Yes

40022. Square root

1. No
2. Yes

40009.Direction for Current Output

1. DIRT
2. REVR

40010.OPSE for Current Output

1. DNSC
2. UPSC

Table-1.2

Input type	Input Cal. Range for Modbus
E- TC	-2000 to 10000
J- TC	-2000 to 12000
K- TC	-2000 to 13700
T- TC	-2000 to 4000
B- TC	4500 to 18000
R- TC	0 to 17500
S- TC	0 to 17500
N- TC	-2000 to 13000
RTD 3/4 Wire	-2000 to 8500
Linear(0-75mV,0-500mV, 4-20mA , 0-20mA)	-1999 to 9999*
Potentiometer	-1999 to 9999*

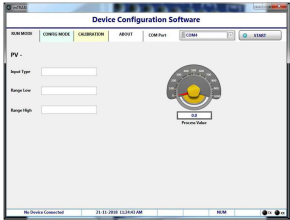
* For Linear, mA and Potentiometer input type, Input cal. Range depends on Zero and Span Range Configured in Device.

- Process Value of device will show "over" when process value is higher than 5% of individual span. At that time Device will send '32766' by Modbus to PC.
- Same way when process value is lower than 1 % of individual zero, Device will show "undr" on its display but it will send '32765' by Modbus to PC.
- If process value is out of limit for particular I/P type, then device will show "Open" on display but it will send '32767' by Modbus to PC.

mTran Software Modes

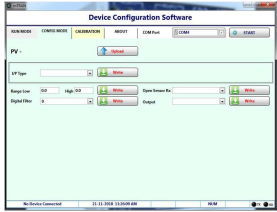
RUN Mode:

- Run Mode displays process values, Input Types, Range High, Range Low, Ambient Temperature,
- Start communication button is available in the screen. So User Can Start/Stop Communication and select the COM Port from any window.



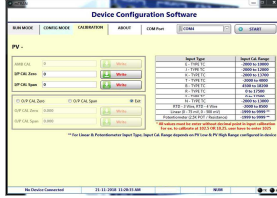
CONFIG Mode:

- In configuration mode user can set I/P type, Range low, Range high, PV Low, PV High, O/P Low, O/P High, O/P Zero, O/P Span, Digital filter, Open sensor O/P (Upscale/Downscale), Output type (Direct/Reverse), Unit (Deg C, Deg F, Deg K), Square root (Square root PV on/off).
- User can see updated process values in all screens.
- After successfully write/download, the status message displays in status box.

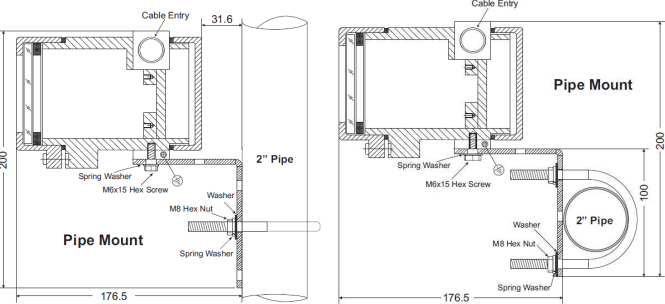
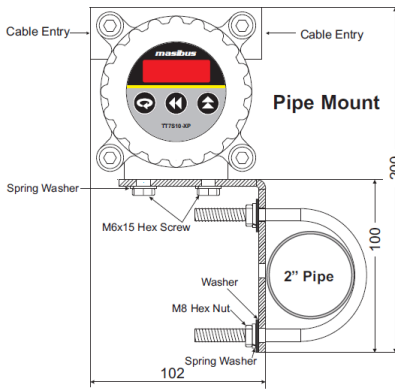
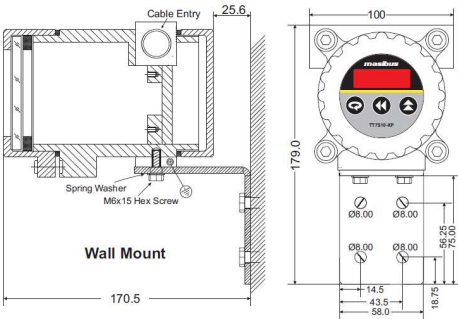


CALIBRATION Mode:

- In calibration mode user can write CAL-Zero, CAL-Span, Ambient Calibration, output-Zero Calibration and output-Span Calibration.
- After successfully write/download, the status message displays in status box.



TT7S10-XP Dual Compartment Mounting Positions



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