Temposonics®

Magnetostrictive Position Sensors

L Series (Model LH) to
G-Series Linear-Position Sensor

550956 A

Cross Reference

Replacement and retrofit options for the L-Series Model LH sensor

L-Series model LH number descriptors

Sensor model
A Flange type
B Connection type
C Integral cable length
D Stroke length
E Input voltage
F Output

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
L	H	T	D	6	0	0	U	#	#	#	#	1	V	0		
		S	M	S	#	#	M	#	#	#	#	2	A	0		
		M	R	B									A	1		
		N	R	G									A	2		
		B	R	0									A	3		
			R	1									R	0		
			R	2									N	0		
			R	3									D	I	#	#
			R	M									D	E	#	#
			H	0												

G-Series model number descriptors (Model LH retrofit options)

Sensor model
A Flange type
B Stroke range
C Connection type
D Input voltage
E Output type (Note 2)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
G	H	T	#	#	#	#	U	D	6	0	1	V	#	(C)
		S	#	#	#	#	M	R	B	#	2	A	#	(C)
		M						F	M	#		R	0	(#)
		B						R	#	#		N	0	(#)
								F	#	#		D	I	#
												D	E	#

Notes:

1. Many of the G-Series "backwards compatible" options as shown above are not included in other G-Series literature.
2. The characters (C) and (#) in parenthesis, as shown above, indicate model number characters that are not usually needed, and are used only for certain options.

Contact MTS Applications Engineering for any model LH options that are not cross referenced in this document.

ISO 9001 CERTIFIED

G-Series Cross Reference

A Flange Type (and hydraulic application housing)

LH model number example:

L	H	T														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

G-Series equivalent model number example:

G	H	T												
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

LH Model	GH	Description
T	T	US cust. threads, raised-faced hex
S	S	US cust. threads, flat-faced hex
M	M	Metric threads, flat-faced hex
N	Not available	Metric threads, raised-faced hex
B	B	Sensor cartridge only (no hydraulic application housing)

B Connection Type

LH model number example:

L	H	T	R	0	0	5										
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

G-Series equivalent model number example:

G	H	T						R	0	5				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Reverse-acting outputs, please note: If the G-Series sensor is replacing an L-Series sensor, where the reverse-acting output, 10 to 0 Vdc, 20 to 4 mA or 20 to 0 mA is being used, then the wire connections must be changed at the controller. If an old or new D6 (D60) style extension cable will be used, reference the Wiring/Connections section of the G-Series User's Manual for the correct wiring at the controller. Otherwise, please reference the corresponding table and/or notes for the connection option chosen below.

LH — GH retrofit options

D6 Your LH has an integral D6 male connector. To retrofit, the GH model has the same option available:
Select option "D60" for integral 6-pin DIN male connector.

RB Your LH has an integral RB male connector. To retrofit, the GH model has 3 options available:
1. Select option "D60" for integral 6-pin DIN male connector, AND replace your complete extension cable (sold separately), or replace just the extension cable connector with the field-installed in-line 6-pin DIN female connector, part no. 370423, soldering required, (sold separately). See Table A on page 4.
2. Select option "D60" for integral 6-pin DIN male connector, AND use the adapter cable part no. 253243-x or 253244-x, (sold separately). See Table B on page 4. (For reverse-acting outputs, see Note 2 under Table A.)
3. Select option "RB#" for integral cable with in-line RB male connector. Select "RB1" for 1 foot integral cable length, (standard), or "RB2" for 5 foot integral cable length. (For reverse-acting outputs, see Note 2 under Table A.)

RG Your LH has an integral RG male connector. To retrofit, the GH model has 2 options available:
1. Select option "D60" for integral 6-pin DIN male connector, AND replace your complete extension cable (sold separately), or replace just the extension cable connector with the field-installed in-line 6-pin DIN female connector, part no. 560700, soldering required, (sold separately). See Table C on page 4.
2. Select option "D60" for integral 6-pin DIN male connector, AND use the adapter cable part number 253248-1 (1 foot) or 253248-2 (5 feet), (sold separately). (For reverse-acting outputs, see Note 1 under Table C on page 4).

MS Your LH has an integral 10-pin MS male connector. To retrofit, the GH model has 3 options available:
1. Select option "D60" for integral 6-pin DIN male connector, AND replace your complete extension cable (sold separately), or replace just the extension cable connector with the field-installed in-line 6-pin DIN female connector part number 560700, soldering required, (sold separately) See Table D on page 5.
2. Select option "D60" for integral 6-pin DIN male connector, AND use the adapter cable part no. 253245-x, or 253246-x, (sold separately). See Table E on page 5. (For reverse-acting outputs, see Note 2 under Table D on page 5).
3. Select option "FM#" for integral cable (polyurethane jacket) with the in-line MS male connector. Select "FM1" for 1 foot integral cable length, (standard) , or "FM2" for 5-foot integral cable length. (For reverse-acting outputs, see Note 2 under Table D on page 5.)

R0 Your LH has an integral cable, pigtail termination. To retrofit, the GH model has 1 option available:
Select option "R##" for integral cable, pigtail termination, encode ## with the desired cable length (01 to 99 ft.) (For reverse-acting outputs, reference the Wiring/Connections section of the G-Series User's Manual for the correct wiring at the controller.).

R1 or R2 Your LH has an integral cable and an in-line 6-pin MS male connector. To retrofit, the GH model has 2 options available:
1. See Table F on page 5 or contact MTS Applications Engineering to see if you can connect the GH model sensor directly to your controller / interface card, and no longer use the Analog Output Module (AOM), or the Digital Interface Box (DIB) that is in your system.
2. If the AOM or DIB is still required in your system, select option "D60" for integral 6-pin DIN male connector, AND use the adapter cable part no. 253302-1 (for R1) or 253302-2 (for R2), (sold separately).
3. If the AOM or DIB is still required in your system, select option "R##" for integral cable with pigtail termination, (encode ## for cable length), AND install an in-line 6-pin MS female connector, part no. 370015, soldering required, (sold separately). See Table G on page 6.

R3 Your LH has an integral cable and an in-line 10-pin MS male connector. To retrofit, the GH model has 3 options available:
1. Select option "D60" for integral 6-pin DIN male connector, AND replace your complete extension cable (sold separately).
2. Select option "D60" for integral 6-pin DIN male connector, AND use the adapter cable part no. 253245-3, (1 foot length), or 253246-3, (5 foot length), (sold separately).
3. Select option "R##" for integral cable with pigtail termination, (encode ## for cable length) AND install an in-line 10-pin MS male connector, part no. 370160, soldering required, (sold separately). See Table H on page 6.

G-Series Cross Reference

C Integral cable length

LH model number example:

L	H	T	R	0	0	5										
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

G-Series equivalent model number example:

G	H	T						R	0	5				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

LH Model	GH	Description
01 to 99 ft.	01 to 99 ft.	Cable length in feet
01 to 30 meters	01 to 30 meters	Cable length in meters

Note:
Encode length in feet if using US customary stroke length, in meters if using metric stroke length.

D Stroke length

LH model number example:

L	H	T	R	0	0	5	U	0	1	2	0					
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

G-Series equivalent model number example:

G	H	T	0	1	2	0	U	R	0	5				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

LH	GH	Description
U ___ ___ . __	___ ___ . __ U	Stroke length in inches and tenths, 2 to 300 in. (Encode in 0.1 in. increments)
M ___ ___ ___	___ ___ ___ M	Stroke length in millimeters, 50 to 7620 mm. (Encode in 5 mm increments)

E Input voltage

LH model number example:

L	H	T	R	0	0	5	U	0	1	2	0	1				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

G-Series equivalent model number example:

G	H	T	0	1	2	0	U	R	0	5	1/2			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Notes:

1. Compared to the L-Series the input voltage options “1” and “2” have basically swapped values for the G-Series. (The G-Series follows the convention established by the E-Series and R-Series sensors.)
2. For the above example, when retrofitting LH sensors with stroke lengths < or = to 60 inches, the appropriate GH option (“1” or “2”) must be selected based on the customer’s actual power supply used in the application.

Option	LH	GH
1	+13.5 to 26.4 Vdc (For stroke lengths < or = 60 inches)	+24 Vdc (+20%, -15%), standard
2	+24 Vdc (+10%, - 10%) (For stroke lengths > 60 inches)	+9 to +23 Vdc

F Output type

LH model number example:

L	H	T	R	0	0	5	U	0	1	2	0	1				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

G-Series equivalent model number example:

G	H	T	0	1	2	0	U	R	0	5	1/2			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

LH	GH	Description
Start/Stop		
R0	R0(#)	Start/Stop output. If the sensor has more than one magnet, the (#) denotes the number of magnets in hexadecimal, (i.e. 2 - F). If the sensor has only one magnet, leave the (#) character in the model number blank.
N0	N0(#)	Start/Stop output wired for square wave neuter (“+Stop” signal used for compatible neuter output pulse). If the sensor has more than one magnet, the (#) denotes number of magnets in hexadecimal, (i.e. 2 - F). If the sensor has only one magnet, leave the 15th character in the model number blank.
Pulse-Width Modulated (PWM)		
D __ __ __ (a b c)	D __ __ (a b)	PWM output. The first character (a) indicates the type of interrogation, (E = external, I = internal), for both LH and the GH model. The other characters (b-c) for LH indicate the number of circulations. For the GH model encode this value, (now limited between 1 and 15), for the single character (b) using hexadecimal, (1 to F).
Analog		Voltage (format below is: “Voltage [value at Null (Setpoint 1)] to [value at Span (Setpoint 2)]”
V0	V0	0 to +10 Vdc (If the 10 to 0 Vdc output is being used, select option “V1”. See note for reverse-acting outputs under section B, “Connection Type”.)
A0	A0	4 to 20 mA
A1	A1	20 to 4 mA (See note for reverse-acting outputs under section B, “Connection Types”.)
A2	A2	0 to 20 mA
A3	A3	20 to 0 mA (See note for reverse-acting outputs under section B, “Connection Types”.)
C0 or CC suffix		Non-standard output. Consult MTS Application Engineering. Usually signifies custom analog setpoints.

G-Series Cross Reference

Tables

Table A

Wire color code for RB style extension cable		Replace RB connector on extension cable by Installing 6-pin DIN female connector, part no. 370423		
RB pin no.	Wire colors	Pin-out for Analog output	Pin-out for Digital-Pulse output	Pin-out for Neuter output only
1	White	6	6	6
2	Brown	No Connection	No Connection	No Connection
3	Gray	2	1	1 (Note 1)
4	Pink	1	2	No Connection
5	Red	5	5	5
6	Blue	No Connection	No Connection	No Connection
7	Black	3 (Note 2)	No Connection	No Connection (Note 3)
8	Violet	4 (Note 2)	No Connection	2
9	Yellow	No Connection	3	3 (Notes 4, 5)
10	Green	No Connection	4	4 (Notes 4,5)

Notes:

1. The G-Series output signal, "(-) Stop", is not used when providing the backwards –compatible neuter type connection. However, this signal wire / connector pin is used for "RS-422 TX-" during serial programming of the sensor. When the sensor output is active, (not in programming mode), this signal must be left unconnected to allow the proper neuter type output.
2. If the G-Series sensor is replacing a L-Series sensor where the reverse-acting output, 10 to 0 Vdc, is being used, then the wire connections must be changed at the controller. The black wire (RB pin 7) will now be used for "Programming (RS-485+)" by the G-Series sensor instead of the 10 to 0 Vdc reverse-acting output. Also, the violet wire (RB pin 8) will now be used for "Programming (RS-485-)" by the G-Series sensor instead of the return connection for the reverse-acting output. The input connections at the controller will now need to use the pink wire (RB pin 4) for the 10 to 0 Vdc sensor signal, and the gray wire (RB pin 3) for the output return connection.
3. If the black wire (RB pin 7) was originally used as DC ground for the L-Series sensor being replaced then the DC ground connection at the controller must be changed to use the white wire (RB pin 1).
4. When connecting to an Analog Output Module (AOM), or to a Digital Interface Box (DIB), or to a custom interface/controller that requires single-ended interrogation, always connect the unused interrogation lead, "(+) Start" or "(-) Start" to ground at the AOM / DIB / controller.
5. For improved noise rejection and stable operation when using external interrogation use the positive and negative interrogation signals, "(+) Start" and "(-) Start", to provide differential inputs to the sensor.

Table B

Female straight exit D6 to male RB connection adapter cables	
1 ft. cable length, standard, for G-Series analog output sensors	Part no. 253243-1
1 ft. cable length, standard, for G-Series digital-pulse and neuter output sensors	Part no. 253243-2
5 ft. cable length, for G-Series analog output sensors	Part no. 253244-1
5 ft. cable length, for G-Series digital-pulse and neuter output sensors	Part no. 253244-2

Note:

For reverse-acting outputs, see Note 2 under Table A.

Table C

Wire color code for RG style extension cable		Replace RG connector on extension cable by installing 6-pin DIN female connector, part no. 560700
RG pin no.	**Color**	**Pin-out for Analog outputs and for Digital-pulse outputs**
1	Gray	1
2	Pink	2
3	Yellow	3 (Note 1, 2, 3)
4	Green	4 (Note 1, 2, 3)
5	Red or Brown	5
6	White	6
7	No connection	No connection

Notes:

1. If the G-Series sensor is replacing a L-Series sensor where the reverse-acting output, 10 to 0 Vdc, 20 to 4 mA or 20 to 0 mA, is being used, then the wire connections must be changed at the controller. The yellow wire (RG pin 3) will now be used for "Programming (RS-485+)" by the G-Series sensor instead of the reverse-acting output. Also, the green wire (RG pin 4) will now be used for "Programming (RS-485-)" by the G-Series sensor instead of the return connection for the reverse-acting output. The input connections at the controller will now need to use the gray wire (RG pin 1) for the 10 to 0 Vdc, 20 to 4 mA or 20 to 0 mA sensor signal, and the pink wire (RG pin 2) for the output return connection.
2. When connecting to an interface/controller that requires single-ended interrogation, always connect the unused interrogation lead, "(+) Start" or "(-) Start" to ground at the controller.
3. For improved noise rejection and stable operation when using external interrogation use the positive and negative interrogation signals, "(+) Start" and "(-) Start", to provide differential inputs to the sensor.

Tables continued

Table D

Wire color code for MS style extension cable (10-pin MS connector)		Replace 10-pin MS connector on extension cable by installing 6-pin DIN female connector, part no. 560700	
MS pin no.	**Color**	**Pin-out for Analog output**	**Pin-out for Digital-Pulse output**
A	White	6	6
B	No connection	No connection	No connection
C	Gray	2	1
D	Pink	1	2
E	Red	5	5
F	No connection	No connection	No connection
G & J (Note 1)	Yellow	3 (Note 2)	3 (Notes 3, 4)
H & K (Note 1)	Green	4 (Note 2)	4 (Notes 3, 4)

Notes:

1. The MS style extension cable is assembled with the yellow wire connected to pin G only, and the green wire connected to pin H only. However, pins G & J are connected together, and H & K are connected together via the interconnect board within the L-Series sensor model having the MS style connection.
2. If the G-Series sensor is replacing a L-Series sensor where the reverse-acting output, 10 to 0 Vdc, 20 to 4 mA or 20 to 0 mA, is being used, then the wire connections must be changed at the controller. The yellow wire (MS pin G) will now be used for "Programming (RS-485+)" by the G-Series sensor instead of the reverse-acting output. Also, the green wire (MS pin H) will now be used for "Programming (RS-485-)" by the G-Series sensor instead of the return connection for the reverse-acting output. The input connections at the controller will now need to use the pink wire (MS pin D) for the 10 to 0 Vdc, 20 to 4 mA or 20 to 0 mA sensor signal, and the gray wire (MS pin C) for the output return connection.
3. When connecting to an interface/controller that requires single-ended interrogation, always connect the unused interrogation lead, "(+) Start" or "(-) Start" to ground at the controller.
4. For improved noise rejection and stable operation when using external interrogation use the positive and negative interrogation signals, "(+) Start" and "(-) Start", to provide differential inputs to the sensor.

Table E

Female straight exit D6 to male MS connection adapter cables	
1 ft. cable length, standard, for G-Series analog output sensors	Part no. 253245-1
1 ft. cable length, standard, for G-Series digital-pulse sensors	Part no. 253245-2
5 ft. cable length, for G-Series analog output sensors	Part no. 253246-1
5 ft. cable length, for G-Series digital-pulse sensors	Part no. 253246-2

Note:

For reverse-acting outputs, see Note 2 under Table D.

Table F

If your system has an Analog Output Module (AOM)	If your system has a Digital Interface Box (DIB)
You can connect the GH model sensor directly to your controller/interface card (bypassing the AOM) if: 1. The AOM output is displacement only (voltage or current). 2. There is no velocity output from the AOM. 3. There are no dual channel outputs from the AOM. 4. There are no external null or scale adjustment potentiometer inputs to the AOM. *Contact MTS Applications Engineering for the appropriate retrofit GH model number, or if you have questions.*	You can connect the GH model sensor directly to your controller/interface card (bypassing the DIB) if: The DIB is configured to use 15 or less recirculations. *Contact MTS Applications Engineering for the appropriate retrofit GH model number, or if you have questions.*

G-Series Cross Reference

Tables continued

Table G

GH Model		**Installing 6-pin MS female connector, part no. 370015, onto GH model sensor with integral cable**	
Integral Wire Color Code	Output for "Square Wave" Neuter (Using "+Stop")	For "R1" connection type: (positive interrogation)	For "R2" connection type: (negative interrogation)
Gray	(-) Stop	No Connection (note 1)	No Connection (note 1)
Pink	(+) Stop (Compatible Neuter Output Pulse)	C	C
Yellow	(+) Start	E	B (note 2)
Green	(-) Start	B (note 2)	E
Red or Brown	Supply Voltage (+Vdc)	F	F
White	DC Ground (for supply)	B	B

Notes:

1. The G-Series output signal, "(-) Stop", is not used when providing the backwards-compatible neuter type connection. However, this signal wire is required for "RS-422 TX –" during serial programming of the sensor. Pin A of the 370015 connector can not be used for this signal since the Analog Output Module (AOM), or the Digital Interface Box (DIB), provides +12 to +14.5 volts output on this pin when connected. Upon installing the 370015 connector the gray wire must be left disconnected, and the serial programming feature of the sensor is no longer available.
2. When connecting to an AOM, or to a DIB, or to a custom interface/controller that requires single-ended interrogation, always connect the unused interrogation lead to ground at the AOM/DIB/Controller.

Table H

GH Model		**Installing 10-pin MS male connector, part no. 370160 (for R3 connection type only), onto the GH model sensor with integral cable**
Integral Wire Color Code	**Digital pulse Output**	**Pin No.**
Gray	(-) Gate for PWM (-) Stop for Start/Stop	K
Pink	(+) Gate for PWM (+) Stop for Start/Stop	G
Yellow	(+) Interrogation for PWM (note 1) (+) Start for Start/Stop	E (See Note below)
Green	(-) Interrogation for PWM (note 1) (-) Start for Start/Stop	D (See Note below)
Red or Brown	Supply Voltage (+Vdc)	H
White	DC Ground (for supply)	A

Note:

For improved noise rejection and stable operation when using external interrogation, use the positive and negative interrogation signals, "(+) Start" and "(-) Start", to provide differential inputs to the sensor.

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