SPD
USER MANUAL

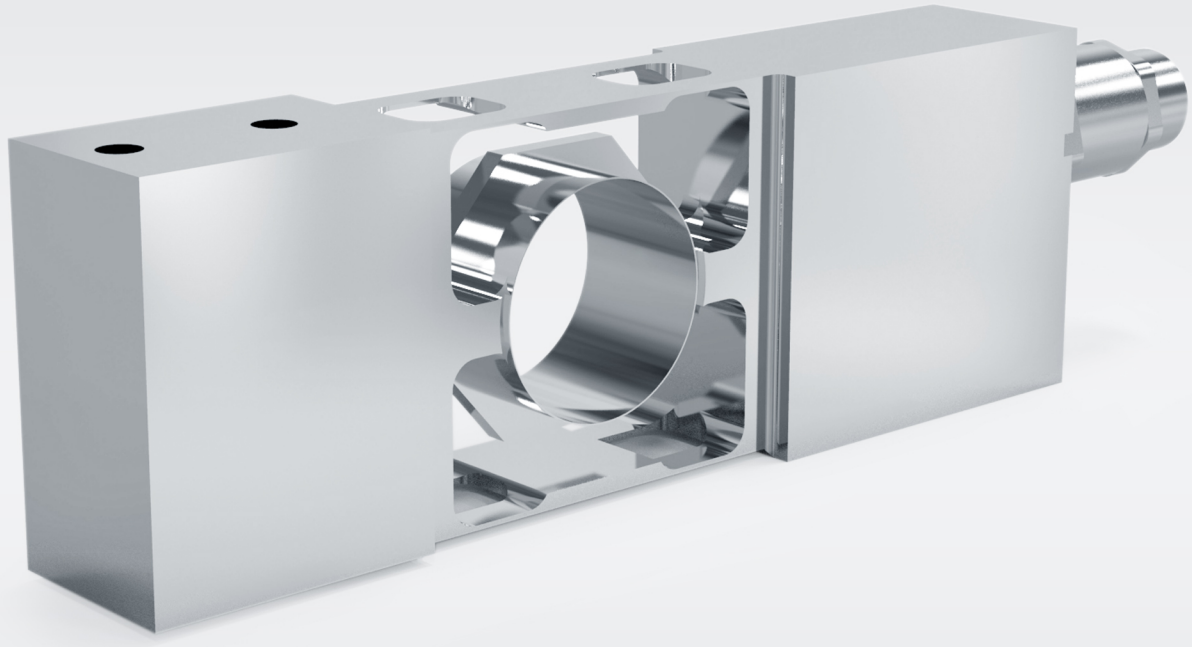

TABLE OF CONTENTS

1. APPLICATIONS

The type SPD is a digital version of single point load cell with complete hermetic sealing. It is a perfect fit for use in harsh industrial environments and wash-down applications.

- Bench scales
- Conveyor scales
- Filling machines
- Packaging machines
- Check weighers
- Industrial process control

Group Four Transducers
22 Deer Park Drive,
E. Longmeadow, MA 01028
www.groupfourtransducers.com

Phone : (800) 419 1444
Fax : (413) 525 -6182
sales@group-4.com

2. CHARACTERISTIC FEATURES

• Capacities from 10 to 50 kg.

• Stainless steel construction.

• Environmental protection IP69k with complete hermetic sealing.

• AD conversion rate up to 1200upd/sec.

• Free professional software for setting up the digital load cell.

• Maximum platform size up to 450 x 450 mm.

3. INTERFACES

SPD load cells are available with the following interfaces.

1. RS232 and CANopen
2. RS485 and RS422 (Both 4 wires)

Additional details are in section 6.3.

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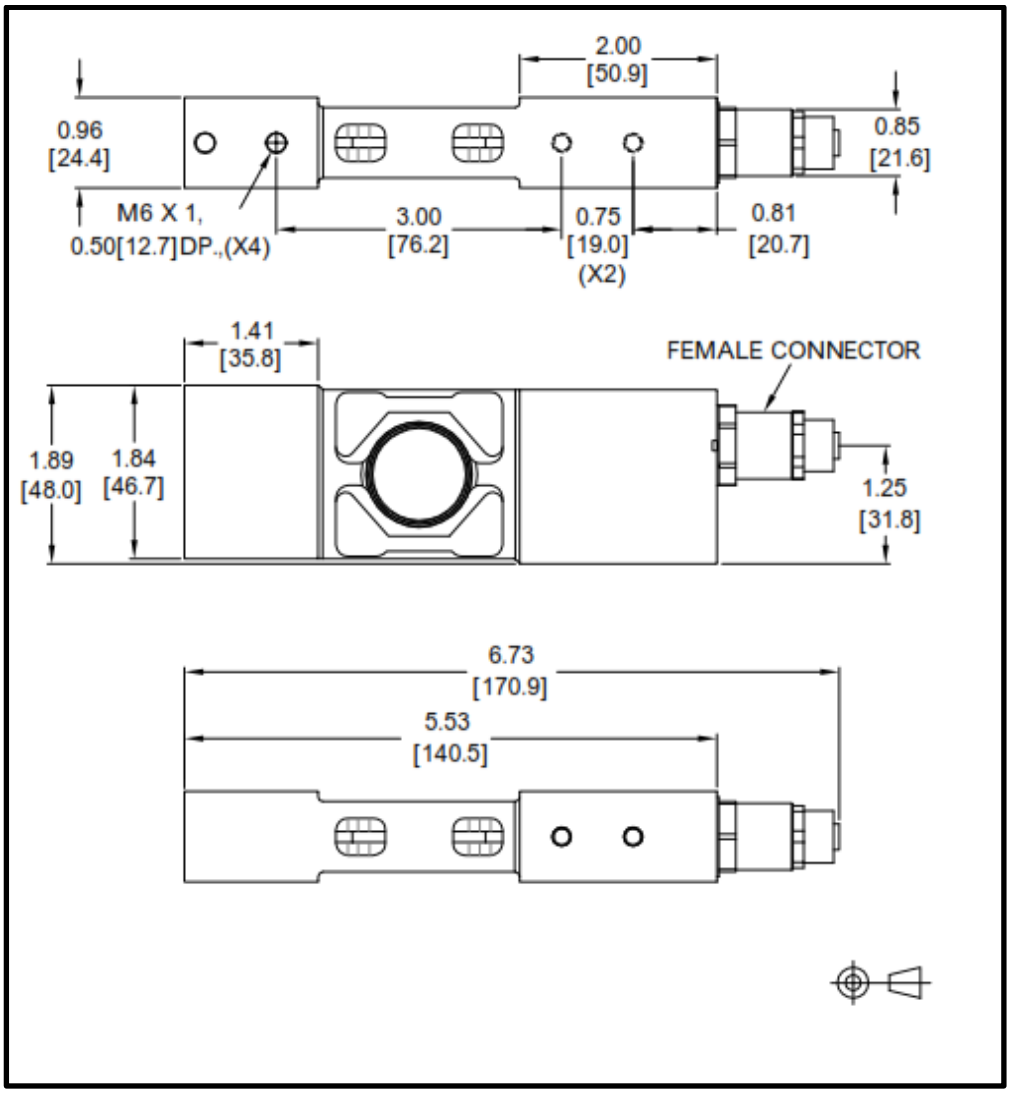
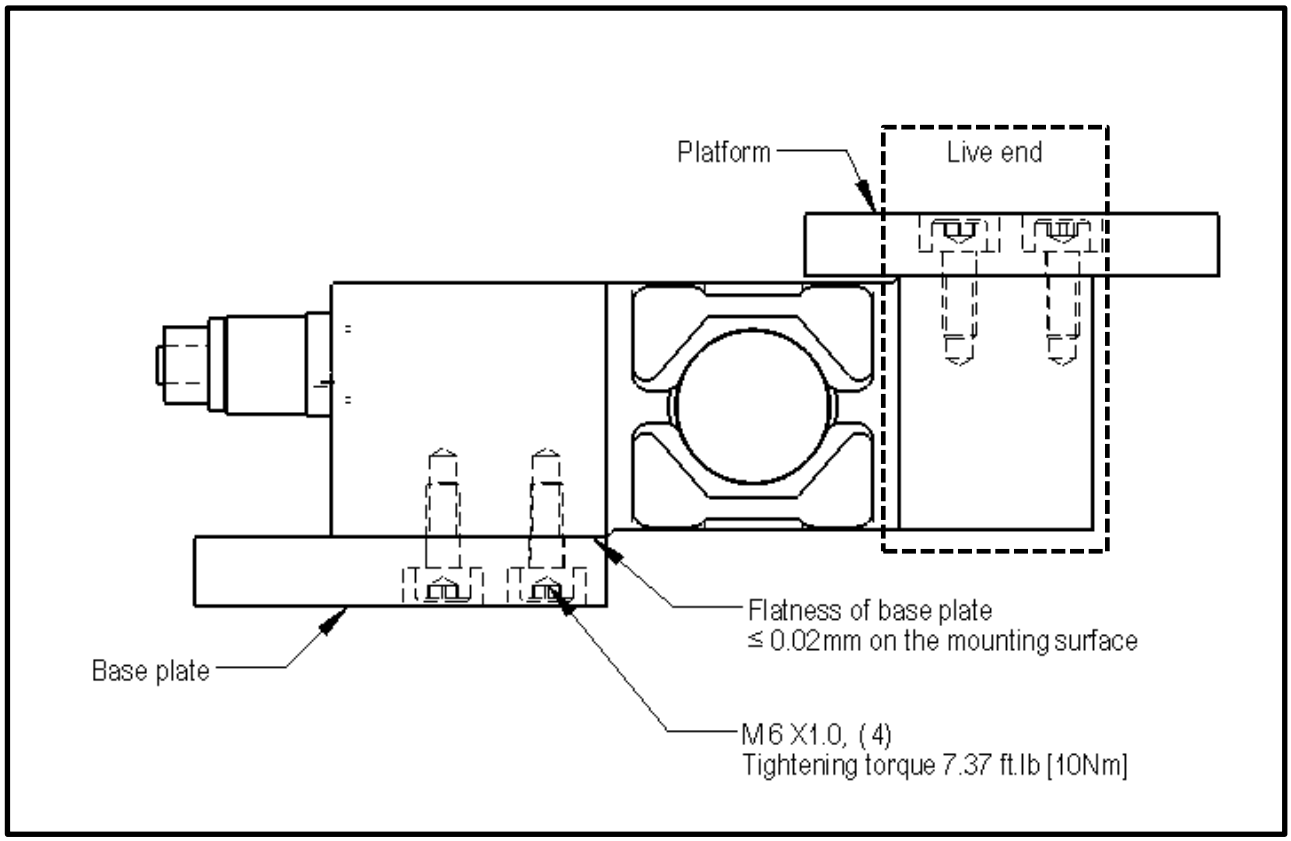
4. MECHANICAL CONSTRUCTIONS

4.1 Outline dimensions



*All Dimensions are in INCH [mm]

5. INSTALLATION INSTRUCTIONS



Note: During installation consider following measures in preventing damages to 20kg and below load cells.
Step 1:- Clamp the live end of the load cell to a vice, mount the platform and tighten to the specified torque.

Step 2:- Then mount the load cell to the base plate.
Reversing this sequence can cause damages to the load cell.

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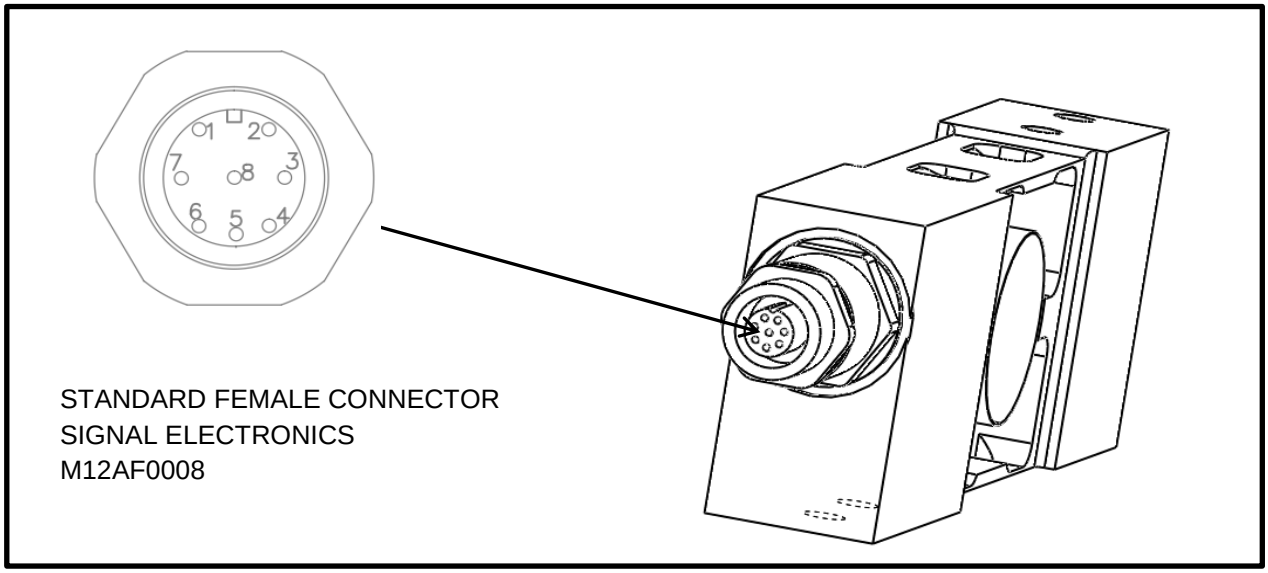
6. ELECTRICAL CONNECTIONS

Caution!
Operating voltage for this load cell is 10-30 VDC. Incorrect connections or exceeding the operating voltage can cause irreversible damages.

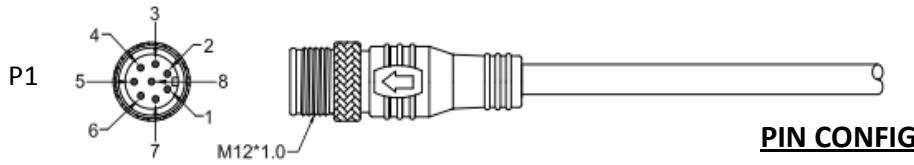
6.1 Wiring diagram



PIN CONFIGURATION

STANDARD FEMALE CONNECTOR SIGNAL ELECTRONICS M12AF0008		
Pin No	Rs-232+CAN	Rs-485+Rs-422
1	GND1	GND1
2	Program	Program
3	CANH	Rx+
4	Trigger input	Trigger Input
5	CANL	Rx-
6	RxD	Tx-
7	TxD	Tx+
8	PWR+	PWR+

6.2 Mating connector pin configuration



M12 A CODING MALE TO OPEN CABLE
SIGNAL ELECTRONICS P/N
SGNTZ1409053-1

PIN CONFIGURATION

P1	COLOR	P2
1	WHITE	OPEN
2	BROWN	
3	GREEN	
4	YELLOW	
5	GRAY	
6	PINK	
7	BLUE	
8	RED	

6.3 Interfaces

SPD load cell offers the following interfaces

RS 232

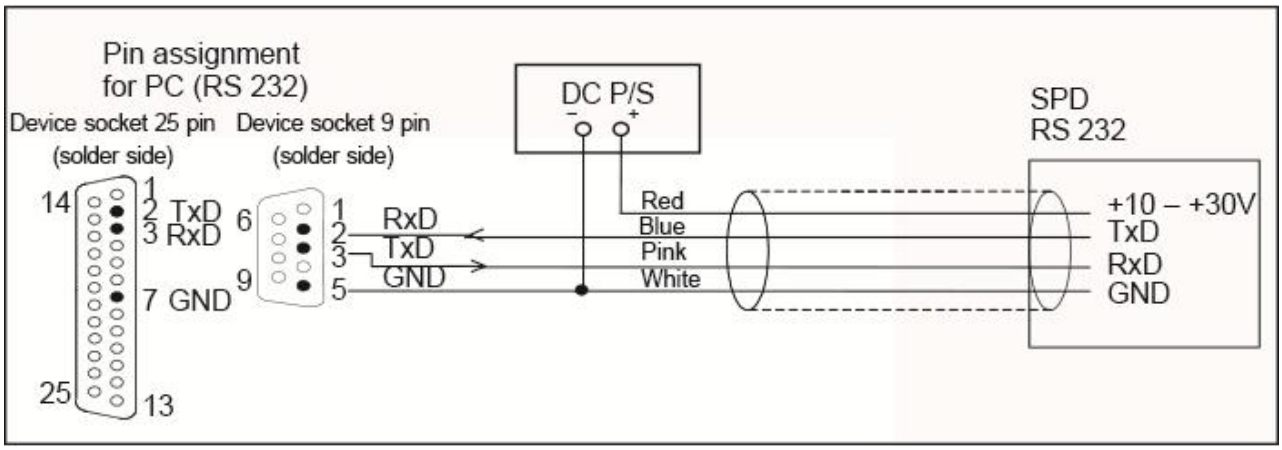
CANopen

RS 485

RS422

The power supply ground and the communication ground are common.

6.3.1 Connecting a SPD load cell to a computer via RS 232 interface



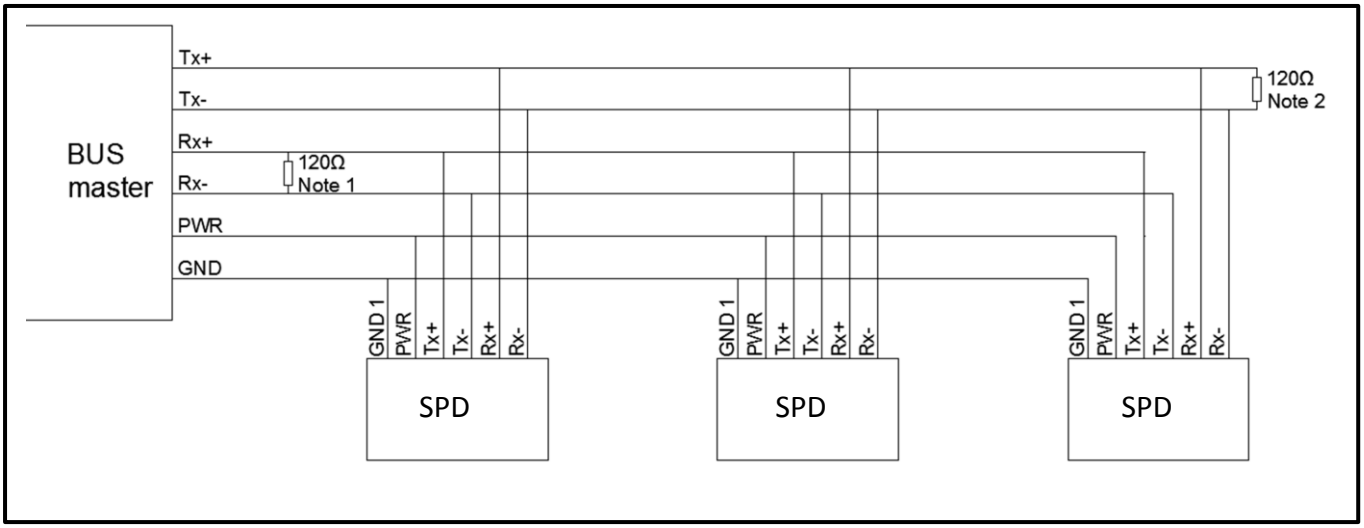
The RS 232 interface is suitable for a point to point connection (one SPD load cell to one interface). Only the signals RxD (Receive Data), TxD (Transmit Data) and GND1 are required. For communication with an external device, the TxD line must be connected to the RxD of the SPD and vice versa.

6.3.2 Connection of SPD load cells to a bus master via RS485

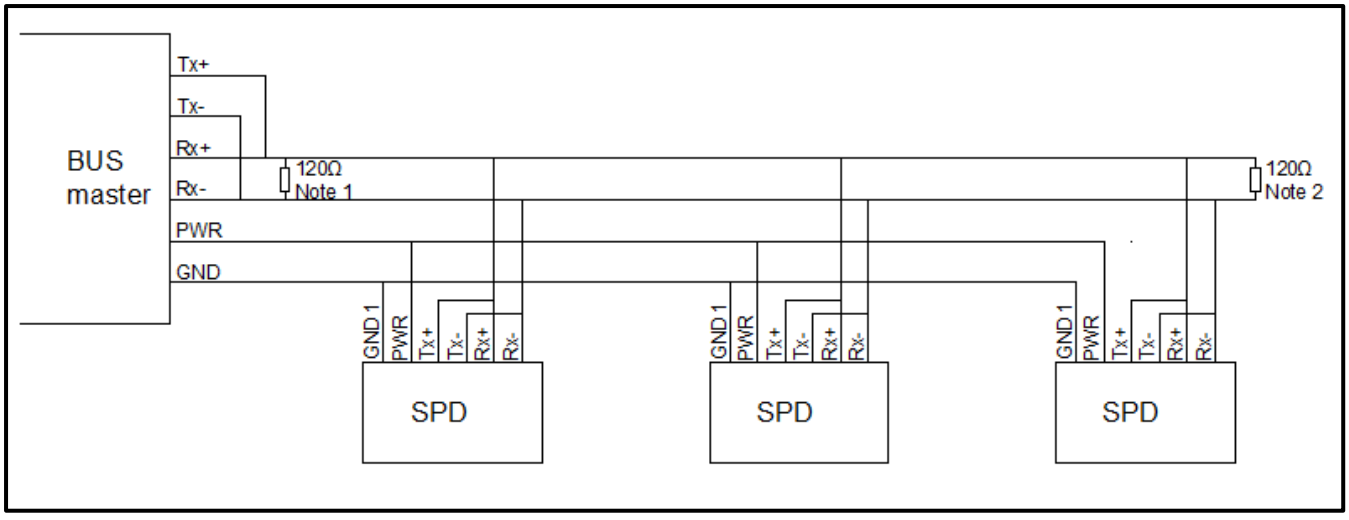
Note 1: Place termination resistor close to the master receiver. In some cases this resistor is already installed inside the master. Please check your documentation for the bus master.

Note 2: Place this resistor close to the last SPD on the bus

6.3.2.1 Four wire RS 485



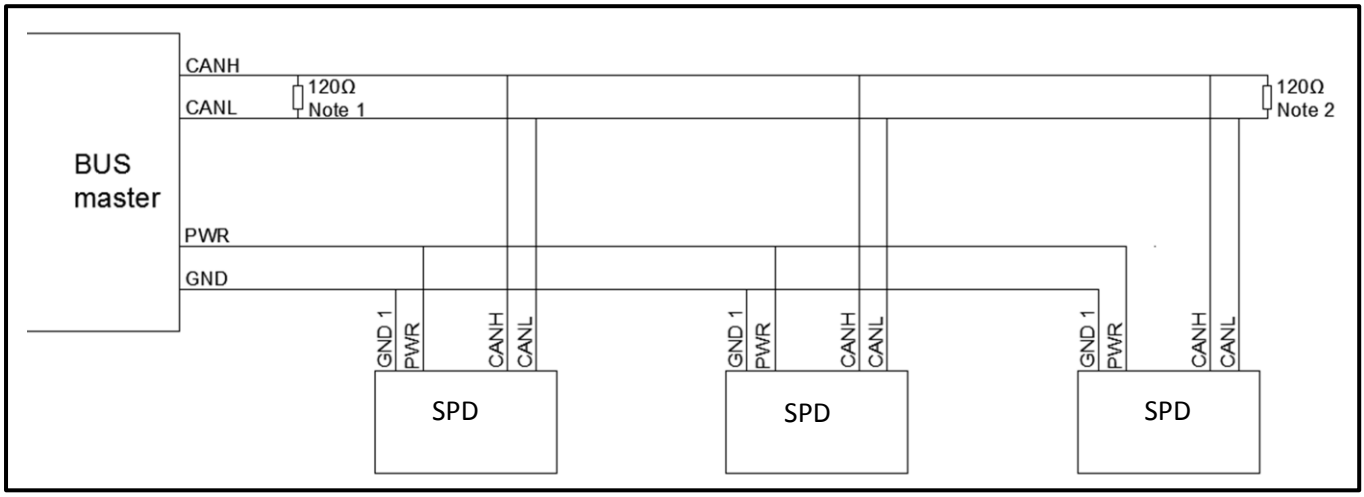
6.3.2.2 Two wire RS485



6.3.3 Connection of SPD load cells to a bus master via CAN bus.

Note 1: Place termination resistor close to the master transceiver. In some cases this resistor is already installed inside the master. Please check your documentation for the bus master.

Note 2: Place this resistor close to the last SPD on the bus or use the integrated termination resistor in the last SPD.



7. SPECIFICATIONS

Model		SPD		
Capacity(E_{max})	kg	10	20	50
Recommended min. External division	g	1	2	5
PERFORMANCES				
Accuracy class according to the OIML R60		C3		
Minimum load cell verification interval(V_{min})	g	E_{max}/10000		
Combined error	%FS	≤±0.017		
Creep error(30min)	%FS	≤±0.017		
Zero balance, raw counts	increments	±2000		
Output resolution at full load, raw counts	increments	256000	512000	512000
Internal AD conversion rate	upd./sec	1200		
Fix, digital Low pass IIR filter, default	Hz	18(Supress 50Hz and 60Hz influence)		
Adjustable , digital Low pass IIR filter Adjustable , digital Low pass FIR filter	Hz	18-0.25; Selectable in 8 steps 40-5; Selectable in 8 steps		
Adjustable, external output update rate	upd./sec	1200-9; Selectable in 8 steps		
GENERAL I/O's				
Hardware interface, CAN version Hardware interface, RS version		CAN and RS232 RS485 and RS422 (Both four wire)		
Data transmission rates CAN Data transm. rates RS485/RS422/RS232	kb	125;250;500;1000 9.6;19.2;38.4;57.6;115.2;230.4;460.8		
Protocol CAN Protocol RS485/RS422/RS232		CANopen ASCII or Modbus RTU		
Logical input, programmable		Trigger level 2-30Vdc,<3mA,Ref to Gnd.		
Power supply	VDC	+10 - +30 ≤ 0.4 Watt		
Connections	Standard 8 pin, female M12AF 0008			
INFLUENCES				
Safe load limit	%* E_{max}	300	150	150
Ultimate load	%* E_{max}	600	300	300
Eccentric loading error acc. to OIML R76	%FS	±0.0233		
Max platform size	mm	450 x 450		
Temperature effect on zero	%FS/ °C	0.001		
Temperature effect on Span	%FS/ °C	0.001		
Temperature range	°C	Operating: -10/+40 Storage: -40/+70		
EMC performance		MID Class E2 (Industrial locations)		
I/O protection, all pins		Reversed polarity; Excess voltage and Surge		
Isolation Body/Electronics at 500VDC	GΩ	≥1		
Vibration		2.5G operational; 5G non-operational		
Environmental protection per IEC 529		Body IP69k; Connectors IP68		
Corrosion resistance		All stainless steel		

8. COMMANDS

For ease of interpretation, the commands have been grouped together and will be described in the following sequence:

8.1 System diagnostics commands
8.2 Calibration commands
8.3 Motion detection commands
8.4 Filter setting commands
8.5 Weigher control commands
8.6 Output commands
8.7 Auto-transmit commands
8.8 Communication set-up commands
8.9 Save set-up parameters command
8.10 User defined information

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8.1 System diagnostics commands

The following three commands provide a means of interrogating the device to confirm the type of device present, the software version of that device and the status. The commands require no parameters and are used as follows:

ID Determine the device ID code - this is a code, which identifies the type of device, which is currently open for communications. Issuing the ID command, which has no parameters, will return the code **D:1510** This code is useful when mixed devices may be present on the bus.

IV Determines the device software version - this identifies the release of software that is installed in the device. This is useful when determining the availability of special commands or features that may have been requested for special applications. Issuing the IV command, which has no parameters, will return the software identification code in the format **V:0104**

IS Determine the device status - Issuing the ID command, which has no parameters, will return a result in the format **S:000000**. This result comprises two 3-digit decimal values, which can be decoded according to the table below:

Leftmost 3-digit value:		Rightmost 3-digit value:	
1	Signal stable	1	not used
2	Zero action performed	2	not used
4	Tare active	4	not used
8	not used	8	not used
16	not used	16	not used
32	not used	32	not used
64	not used	64	not used
128	not used	128	not used

Therefore, the example result **S:001000** decodes as signal stable (no-motion) no zero action and no tare.

SR Software Reset – this command will respond with ‘OK’ and after maximum 400ms perform a complete reset of the LDB.

8.2 Calibration commands

CE Set the calibration functions to the enabled state. This command must be issued PRIOR to any attempt to set the calibration parameters CM, CI, MR, DS, DP, CZ, CG, ZT, ZR, FD or CS. Issuing the command without any parameters results in the response **E+XXXXX** where **XXXXX** is the Traceable Access Code (TAC). This is an internal code that is used to record any changes in the calibration settings of the device. This is a critical feature that is required for "approved" applications, as it provides for the control of access to any command that has the potential of changing the weigher calibration value.

CM n Set the maximum allowable output value in interval or range n (1 <= n <= 3). Lower limit 1, upper limit 999999. Issuing the command without any parameters returns the current CM value. This value will determine the point at which the output will change to **ooooooo**, signifying over-range or change to the next range or interval. To set a new value for CM, the command must be preceded by the **CE XXXXX** command, where **XXXXX** is the current TAC. The new CM value required is then input as a parameter of CM, in the format **CM 1 4010**. Factory default setting: Max 1 = 999999, Max 2 = 0, Max 3 = 0. For further information, please refer to section 9 CALIBRATION PROCEDURE.

CI Set the minimum allowable output value. Lower limit -999999, upper limit 0. Issuing the command without any parameters returns the current CI value. This value will determine the point at which the output will change to **uuuuuuu**, signifying under-range. To set a new value for CI, the command must be preceded by the **CE XXXXX** command, where **XXXXX** is the current TAC. The new CI value required is then input as a parameter of CI, in the format **CM -200**. Factory default setting: -9. For further information, please refer to section 9 CALIBRATION PROCEDURE.

MR Select multi range / multi interval.0 = Multi interval, 1 = Multi range. Issuing the command without any parameters returns the current MR value. To set a new value for MR, the command must be preceded by the **CE XXXXX** command, where **XXXXX** is the current TAC. The new MR value required is then input as a parameter of MR, in the format **MR 1**. Factory default setting: 0. For further information, please refer to section 9 CALIBRATION PROCEDURE.

DS Set the display step size - this allows the output to step up or down by a unit other than 1. Permitted values are 1, 2, 5, 10, 20, 50, 100, 200 and 500. To set a new value for DS, the command must be preceded by the **CE XXXXX** command, where **XXXXX** is the current TAC. The new DS value required is then input as a parameter of DS, in the format **DS 100**. In multi range / multi interval applications DS will define the step size in the lowest range / interval. The higher ranges / intervals will use the next step sizes from the list of allowable step sizes. For further information, please refer to section 9 CALIBRATION PROCEDURE. Factory default setting: 1.

DP Set the decimal point position - this allows the decimal point to be positioned anywhere between leftmost and rightmost digits of the 6-digit output result. Permitted values are 0 for the rightmost position, and 6 for the leftmost position. To set a new value for DP, the command must be preceded by the **CE XXXXX** command, where **XXXXX** is the current TAC. The new DP value required is then input as a parameter of DP, in the format **DP 2**. For further information, please refer to section 9 CALIBRATION PROCEDURE. Factory default setting: 3.

CZ Set the calibration zero point - this is the reference point for all weight calculations, and is subject to TAC control. The command returns **ERR** and has no action unless it is preceded by the **CE XXXXX** command, where **XXXXX** is the current TAC. Confirmation of action is provided by the return **OK**. For further information, please refer to section 9, CALIBRATION PROCEDURE.

CG Set the calibration gain (span) value - this is the reference point for the calibration under load, and is subject to TAC control. The lower limit for CG is 1, the upper limit is 999999. The weight signal used for calibration should be as close as possible to the maximum allowable display value (CM) so as to ensure optimum calibration accuracy. A feature provided is the ability to recall the value of the calibration weight used for the current calibration by the issue of a CG command without any parameters. This is useful information for future calibration purposes or for diagnostics. When calibrating the span, the actual value of the calibration weight must be entered as a parameter of the CG command, for example if the output 25000 is required for the weight placed on the load cell, then the calibration command becomes **CG 25000**. The command return "**ERR**" and has no updating action unless it is preceded by the **CE XXXXX** command, where **XXXXX** is the current TAC. **If the load applied to calibrate the span is less than 1% of full scale (2mV/V), the gain calibration will fail and 'ERR' will be returned.** For further information, please refer to section 9 CALIBRATION PROCEDURE.

ZT Zero tracking - this command set the zero track band in divisions (d). Issuing the command without any parameters returns the current ZT value. The command returns **ERR** and has no updating action unless it is preceded by the **CE XXXXX** command, where **XXXXX** is the current TAC. Zerotracking will be performed only on results less than +/-(0.5 * ZT) at a rate of 0.4 d/sec where d = display step size (see DS command). The zero can only be tracked to +/- ZR (see ZR command). A value of zero turns off the zero tracking. Factory default setting: 0.

ZR Zero range - this command set the zero range in divisions (d). Issuing the command without any parameters returns the current ZR value. The command returns **ERR** and has no updating action unless it is preceded by the **CE XXXXX** command, where **XXXXX** is the current TAC.

FD Factory default settings – this command put the LDB back to a known state. The data will be written to the EEPROM and the TAC will be incremented by 1.
NOTE: All calibration and setup information will be lost, by issuing this command. The command returns **ERR** and has no updating action unless it is preceded by the **CE XXXXX** command, where **XXXXX** is the current TAC.

CS Save the calibration values - this command results in the calibration values being saved to EEPROM, and causes the TAC to be incremented by 1. The CS command save all of the calibration group values, as set by CM, CI, MR, DS, DP, CZ, CG, ZT and ZR. The command returns **ERR** and has no updating action unless it is preceded by the **CE XXXXX** command, where **XXXXX** is the current TAC. For further information, please refer to section 9 CALIBRATION PROCEDURE.

8.3 Motion detection commands

The Motion Detection facility provides a means of disabling certain functions whenever a condition of instability, or “motion”, is detected. The “no-motion”, or “stable” condition is achieved whenever the signal is steady for the period of time set by NT, during which it cannot fluctuate by more than NR increments. The stable condition activates the relevant bit of responses to “Info Status” (IS - see section 8.1 System diagnostics commands for further information)
The functions, which are disabled whenever motion is detected, are “Calibrate Zero” (CZ) “Calibrate Gain” (CG) “Set zero” (SZ) and “Set tare” (ST).

NR Set the “no-motion” range - this is the range within which the weighing signal is allowed to fluctuate and still be considered as “stable”. Issuing the NR command without any parameter will return the current value. Set a new value by issuing the NR command followed by the desired value, in the format **NR 5**. Permitted values are between the lower limit of 0 and the upper limit of 65535. Factory default setting: 1.

NT Set the stabilization time for the “in motion” band. This is the time parameter that defines the period during which the output must not fluctuate more than NR increments in order to be considered “stable”. Set a new value by issuing the NT command followed by the desired value in milliseconds, in the format **NT 1000**. Permitted values are between the lower limit of 0 and the upper limit of 65535. Factory default setting: 1000.

8.4 Filter setting commands

The facility exists for the setting of a digital filter via the command parameter FL, and this filter can be adjusted to eliminate most unwanted disturbances. Note that this filter is positioned immediately after the A/D Converter, and will therefore have an effect on all aspects of weigher operation.

FM Filter mode- Permitted values are 0 and 1, see below table.
Issuing the FM command without any parameters will return the current mode value. Set a new value by issuing the FM command by the desired value, in the format **FM 1**.
Factory default setting: 0.

FM value	Filter mode
0	IIR
1	FIR

FL Set the filter - permitted values are between 0 and 8, see table below. Issuing the FL command without any parameters will return the current filter value. Set a new value by issuing the FL command followed by the desired value, in the format **FL 4**.

FL Value	Cutoff frequency (Hz)	
	IIR	FIR
0	None	None
1	18	19.8
2	8	9.7
3	4	6.5
4	3	4.9
5	2	3.9
6	1	3.2
7	0.5	2.8
8	0.25	2.5

UR Set the update rate - this command defines the number of available updates per second, see table below. Issuing the UR command without any parameters will return the current update rate. Set a new value by issuing the UR command followed by the desired value, in the format **UR 2**.

0	1	2	3	4	5	6	7
1200 u/sec	600 u/sec	300 u/sec	150 u/sec	75 u/sec	37.5 u/sec	18.8 u/sec	9.4 u/sec

8.5 Weigher control commands

The following commands provide the means to control the setting and resetting of the zero and tare points. The availability of net weighing depends on these functions. The zero point which is set at calibration time, remains the "true" zero, but the "current" zero will be the basis for the output result. Remember that the "current" zero can be influenced by the "zero tracking" function, and this should be taken into account when designing the application. A basic system control is the disabling of the "set zero"and "set tare"functions whenever the weighing signal is not stable, as defined by the "no-motion" function. Furthermore, the zero point cannot be reset if it has moved more than ZERORANGE away from the original calibration zero point.

SZ Set the system zero - this command will create a "current" zero point which will become the basis for all weigher operation, until further updated by the zero tracking function, or another SZ command or the "reset zero" command (RZ). As previously stated, any attempt to zero a drift of more than +/- ZERORANGE will result in the SZ command being rejected (**ERR**). The SZ command is also rejected if the weighing signal is fluctuating, as defined by the "no-motion" function parameters (NR and NT). The "signal stable" bit in the responses to the "info status" (IS) command must therefore be active before a SZ command can be accepted. Issuing the SZ command, which has no parameters, will return the **OK** or **ERR** response. If **OK** is returned, then the "zero action performed" bit in the response to the "info status" (IS) command will be activated.

RZ Reset the zero point to the "calibration" zero - this command will return the zero point to that which was stored during the calibration procedure. Issuing the RZ command, which has no parameters, will return the **OK** or **ERR** response. If **OK** is returned, then the "zero action performed" bit in the response to the "info status" (IS) command will be de-activated.

ST Set the tare point - this command will activate the net weighing function, by storing the current weighing signal output value as a tare value. The ST command is rejected if the weighing signal is fluctuating, as defined by the "no-motion" function parameters NR and NT. The "signal stable" bit in the "info status" return must therefore be active before a ST command can be accepted. Issuing the ST command, which has no parameters, will return the **OK** or **ERR** response. If **OK** is returned, then the "tare active" bit in the response to the "info status" (IS) command will be activated.

RT Reset the tare - this command cancels the net weighing mode, and restores the current zero. The weighing signal output returns to the gross mode. Issuing the RT command, which has no parameters, will return the **OK** or **ERR** response. If **OK** is returned, then the "tare active" bit in the response to the "info status" (IS) command will be activated.

8.6 Output commands

The following command provides the means of obtaining an output results from the device.

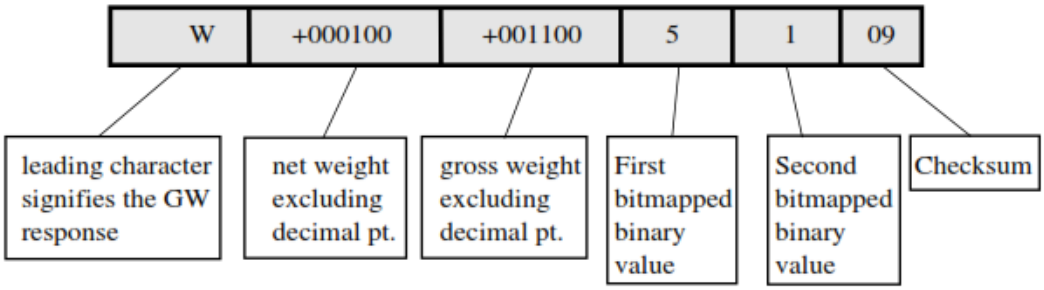
GG Get the gross value - returns the current gross weight value. Issuing the GG command, which has no parameters, will return the gross weight value in the format **G+001.100**.

GN Get the net value - returns the current net weight value. Issuing the GN command, which has no parameters, will return the net weight value in the format **N+001.100**.

GT Get the tare value - returns the current tare weight value. Issuing the GT command, which has no parameters, will return the tare weight value in the format **T+001.100**.

GS Get the A/D sample value – returns the current output result of the A/D converter (ADC). This facility is useful when developing the application, or when calibrating the system, as it allows a check to be made of the operating range of the ADC. Issuing the GS command, which has no parameters, will return the ADC output value in the format **S+100000.**

GW Get the "long" weight values - returns the current net, gross and status values. Issuing the GW command, which has no parameters, will return the net weight, the gross weight, the status and the checksum values, all combined into one single string in the format **W+000100+0011005109**. The first two sections of the return string comprise the net weight and gross weight results, followed by two hexadecimal characters, which represent two bitmapped status indicators. The last two hexadecimal characters represent the checksum, which is the inverse of the sum of all the ASCII values of the string, not including the checksum characters.



The bitmapped characters are:

First Bit value	description	Second Bit value	description
1	not used	1	Signal stable
2	not used	2	Zero action performed
4	not used	4	Tare active
8	not used	8	not used

The checksum is derived as follows:

a. Add the ASCII values of all the 17 characters in the string
b. Convert the decimal result to hexadecimal
c. Remove the most significant digit from the hexadecimal result
d. Invert the remaining hexadecimal value
e. Convert the hexadecimal value to characters

8.7 Auto-transmit commands

The following command provide the means to output the weight results in a continuous stream, which starts upon the issue of the relevant command, and ends upon the issue of any other command.

SG Auto-transmit the gross weight value - continually returns the current gross weight value. Issuing the SG command, which has no parameters, will continually return the gross weight value in the format **G+001.100**, until interrupted by any other command.

SN Auto-transmit the net weight value - continually returns the current net weight value. Issuing the SN command, which has no parameters, will continually return the net weight value in the format **N+001.100**, until interrupted by any other command.

SW Auto-transmit the long weight value - continually returns the current net weight, the gross and status values. Issuing the SW command, which has no parameters, will continually return the net weight, the gross weight, the status and the checksum values, all combined into one single string in the format **W+000100+0011005109**, until interrupted by any other command. The decode of the string is exactly as per the "long" weight command GW, listed in section 8.6 Output commands. Note that decimal point information is not transmitted.

8.8 Communication set-up commands

AD Set the address of the LDB for networking (0-255). Setting the device address to 0 will set the continuously active mode, where the device becomes permanently active, and will listen and respond to any command on the bus, without the need for an OP xxx command. Issuing the AD command without any parameters will return the current address. Factory default setting: 0.

NOTE: this setting will take effect after power on reset (remember to store the setting using the **WP** command before turning off the power)

BR Set the LDB baud rate. Issuing the **BR** command without any parameters will return the current baud rate. Set a new value by issuing the **BR** command followed by the desired value, in the format **BR 115200**. Factory default setting: 115200.

NOTE: this setting will take effect after power on reset (remember to store the setting using the **WP** command before turning off the power)

DX Half or full duplex – this command select half or full duplex communication. Parameter = 0 select half duplex communication and parameter = 1 select full duplex communication - use half duplex setting when using two wire RS485.

8.9 Save set-up parameters command

The configuration parameters can be considered as three distinct groups, namely:

- Calibration Parameters (CZ, CG, CM, CI, MR, DS, DP, ZT, ZR);
- Indicator Parameters (FM, FL, UR, NR, NT, BR, AD, DX);

The alteration and amendment of the calibration parameters is subject to the control procedure that is described in section 9 CALIBRATION PROCEDURE.
This procedure includes the use of the "Calibration Save" (CS) command. All other settings can be saved using the save command WP.

WP Save the "indicator" set-up parameters - saves the settings of the "Filter" (FM, FL, UR), the "No-Motion" settings (NR, NT) and the communication settings (AD, BR, DX) in the EEPROM

8.10 User defined information

This command enables the user to set a serial number and a text information for identification of the system.

RS Read serial number. Issuing the **RS** command without any parameters will return the current serial number in the format **S:12345678**. Set a new value by issuing the **RS** command followed by a password and then the desired number (Up to 8 digits) in the format **RS 330130 12345678**. Factory default setting: undefined. The serial number will automatically be stored in the internal EEPROM.

9. CALIBRATION PROCEDURE

The calibration interface features a "**TRACEABLE ACCESS CODE**" (**TAC**), as is required for use in "Approved" applications. This feature also ensures that access to the calibration functions is protected from inadvertent or unauthorized change. The following parameters are considered as CALIBRATION commands:

CE: Calibration enable - returns the current TAC value.
CZ: Calibrate zero - sets the system zero point.
CG: Calibrate gain - sets the system gain.
CM: Calibrate maximum - sets the maximum allowable display value in each range.
CI: Calibrate minimum - sets the minimum allowable display.
DS: Display step size - sets the output incremental step size.
DP: Display decimal point - sets the position of the output decimal point.
ZT: Zero track band.
ZR: Zero track range.
FD: Factory default setting (return to)
CS: Calibration save.

To make an enquiry as to the setting of any of these commands requires the issue of the command with no parameters attached. The responses are explained in section 8.2 Calibration commands.

To make a change to the settings of any of these commands **REQUIRES THE ISSUE OF THE CE COMMAND FOLLOWED BY THE CURRENT TAC VALUE (CE XXXXX).**
For example, if the output step value needs to be changed from 1 to 5, the following steps would be required:

Master send: **CE**
Slave returns: **E+00016**
Master send: **CE 16**
Slave send: **OK**
Master send : **DS 5**
Slave send: **OK**

The output will now increment in steps of 5 divisions. It will then be necessary to SAVE the calibration parameters to non-volatile memory, by issuing the CS command. The CS command, which has no parameters and must be preceded by the **CE XXXXX** command, will return **OK** to signify successful update. The TAC is then incremented by 1.

An example of the recommended calibration procedure follows:

9.1 To set the system zero and the system gain

With the device selected a suitable load cell in place, with known test weights available, (the example uses 5000 as a test weight value):

Step 1	Master sends: **CE**	Query the current TAC value
	Slave returns: **E+00017**	
Step 2	Master sends: **CE 17**	Enable the calibration sequence
	Slave returns: **OK**	
Step 3	Master sends: **CZ**	Ensure that the weigher is unloaded
	Slave returns: **OK**	
Step 4	Master sends: **CE 17**	Enable the calibration sequence
	Slave returns: **OK**	
Step 5	Master sends: **CG 5000**	Where 5000 is the weight value added
	Slave returns: **OK**	
Step 6	Master sends: **GG**	Confirm the calibration is correct
	Slave returns: **G+005000.**	
Step 7	Master sends: **CE 17**	Enable the calibration sequence
	Slave returns: **OK**	
Step 8	Master sends: **CS**	Write the calibration data to memory
	Slave returns: **OK**	

The system zero and system gain value will have been updated and written to EEPROM, and the TAC will have been incremented.

10. SPD PART NUMBERS

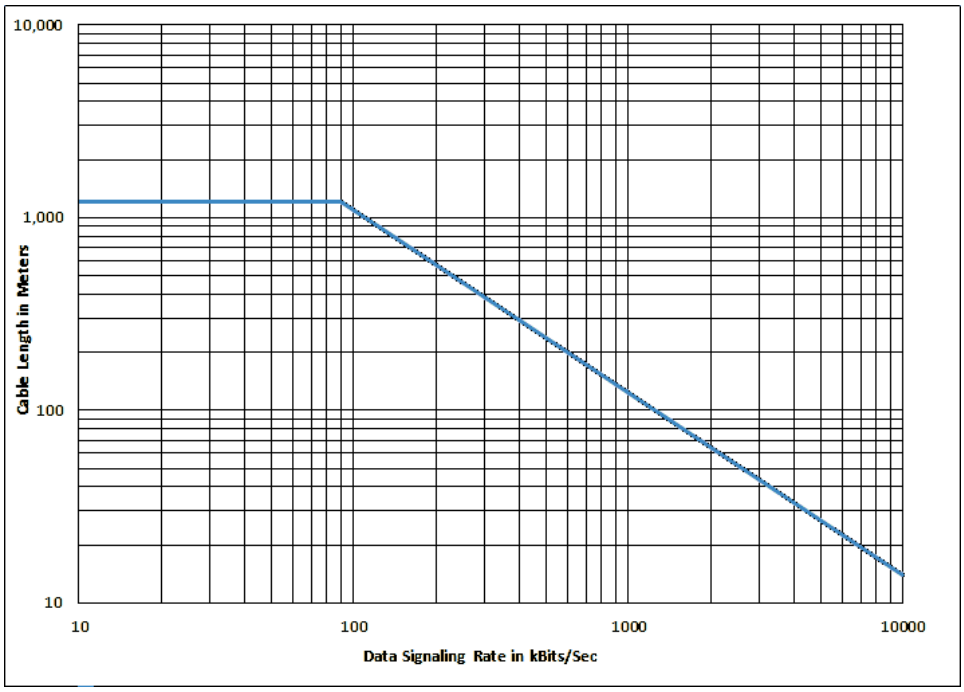
SPD PART NUMBERS						
OPTION	GEN			A		
DESCRIPTION	LDB151 (RS232+CAN)			LDB152 (RS485+RS422)		
CAPACITY	10	20	50	10	20	50
G4 P/N	4046D-001-00	4046D-000-00	4046D-002-00	4046D-001-01	4046D-000-01	4046D-002-01

11. APPENDIX

11.1 Appendix A

Maximum cable length allow for different communication protocols.

RS422/485



CANOpen

Bus Speed	Bus Length (L)	Cable Stub Length (l)	Node Distance (d)
1 Mbit/Sec	40 meters (131 feet)	0.3 meters (1 foot)	40 meters (131.2 feet)
500 kbits/Sec	100 meters (328 feet)	0.3 meters (1 foot)	100 meters (328 feet)
100 kbits/Sec	500 meters (1640 feet)	0.3 meters (1 foot)	500 meters (1640 feet)
50 kbits/Sec	1000 meters (3280 feet)	0.3 meters (1 foot)	1000 meters (3280 feet)

RS232

Baud rate	Maximum cable length (ft)
19200	50
9600	500