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# **DLR334 PRESSURE INDICATOR**

**DUPLEX**

**SERIAL PROTOCOL**



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# DLR334 PRESSURE DUPLEX SERIAL PROTOCOL

## 1.0 GENERAL:

- This document applies to the basic Pressure program KDG-1.
- The duplex protocol includes the following basic functions:
  - ◆ Setup entry and recall.
  - ◆ Current pressure data recall.
  - ◆ Calibration and correction recall and entry.
  - ◆ All front panel key functions.
  - ◆ Temperature calibration and correction recall and entry.
- The protocol between the “standard” full duplex and the RS485 will only differ by the addition of the origin and destination address characters.
- The protocol will be designed to be expandable for future growth and special applications.

## 2.0 FULL DUPLEX PROTOCOL:

Communications from the host computer into the DLR:

\*<DD><OO><cmd><{><data entry><}><CHECK><CR>

Response from the DLR:

:<OO><DD><cmd r><{><data resp><}><CHECK><CR>

Where:

“<”, “>” Brackets are not sent

- \* = Message from master (host computer)(2AH).
- : = Response from DLR (3AH).
- DD = DLR unit address (two digit) if in RS485.
- OO = Master address (fixed at 00) if in RS485.  
If RS485 mode not selected the “DD” and “OO” are not transmitted.
- Cmd = Three character command to DLR.
- Cmd r = Three character command echoed from DLR.
- { = Start of data character (7BH).
- } = End of data character (7DH).  
{‘ and ‘}’ only sent if data entry or recall.
- Data entry= Data entered into DLR if entry command.
- Data resp = Data response from DLR if in response.
- CHECK = Optional two character check if selected.
- CR = Message terminator (0DH).  
A “LF” character following the “CR” will be ignored. All characters following the “CR” and preceding the “\*” will be ignored.

## 3.0 COMMAND CODE <cmd> DESCRIPTION:

The <cmd> consists of three (3) characters “ppt” where:

pp = the command parameter.  
T = the command type.

The three (3) command types (t) are as follows:

Direct cmd code = < D > character (44H).  
‘D’ Commands have no data associated with them.

- ◆ General commands (Zero, etc.).
  - ◆ Display commands (Min,Max, etc.).
  - ◆ Pressure calibration (Zero Cal, etc.).
- Data request code = < R > character (3FH).
- ‘R’ commands requesting data from the host to the DLR.
  - ◆ Pressure data.
  - ◆ Status.
  - ◆ Setup data.
  - Calibration data.
- Data entry code = < E > character (45H).
- ‘E’ commands with data sent from host to be entered into the DLR.
  - ◆ Setup data.
  - ◆ Calibration data.

For complete listing of command codes see Table II.

## 4.0 DATA FORMAT:

### 4.1 GENERAL:

- When data is transmitted it is always bracketed with the ‘{’ and ‘}’ characters.
- The separation character ‘|’ (7CH) is used to separate data in a string.
- All DLR recalled data has leading zero suppression with the zeros transmitted as spaces.
- All data entered into the DLR can have leading zero suppression with the zeros transmitted as spaces but is not required.
- Summary of data formats:
  - PRESSURE: <value><units><par><stat>
  - STATUS:
  - WEIGHT: <stat>
  - INPUT: <I1>|<I2>
  - OUTPUT: <O1>|<O2>
  - SETUP: <par 1>|<par 2>| - - - <par x>

## 5.0 RESPONSE:

- In the print/port 1/duplex setup the response by the DLR from the direct commands and data entry commands can be selected for ‘None’ or Echo’.

‘None’: no response is given a direct cmd (D) or data entry cmd (E) if valid or invalid.

‘Echo’: the command (direct or entry) is echoed as received if valid; the start of transmission character is returned with a ‘:’ not the ‘\*’ character. If invalid a \_NAK\_ is returned

‘Ack/Nak’: instead of echoing back the received command code and entered data the DLR responds with ‘ACK’ (41H, 43H & 48H) in place of the code. If an error in received data is detected the DLR responds with ‘NAK’(4EH, 41H & 48H).

Ack response: :ACK<CR>  
Nak response: :NAK<CR>

- An **invalid** input consists of the following:

- ◆ Parity error.
- ◆ Check error if enabled.
- ◆ Invalid command code.
- ◆ Invalid data format.

Response in Echo or Ack/Nak mode = :NAK<CR>

➤ Commands received as **valid** but that can **not be performed**:

A valid command in the Echo or Ack/Nak mode that can not be performed will respond with:  
**:NAC<CA>**

The conditions that give you a '**NAC**' response are:

- ◆ Not in a valid mode for the command. For example, a 'Cal' command in the 'normal (run)' mode (Refer to Command Performance Status Table Below).
- ◆ The Command is acting on a parameter that is disabled in Configuration. For example, Peak data recall command when the Peak is configured for 'off'. (Refer to Command Performance Status Table I Below).
- ◆ The command is acting on a parameter that can not be performed due to the unit conditions such as motion or over range.

COMMAND 'PERFORM' STATUS TABLE I			
CATEGORY	COMMANDS	MODE VALID	CONFIG. ENABLED
GENERAL	ZED, TAD	RUN	YES
DATA RECALL	PDR, PGR	RUN/CAL	NO
DATA RECALL	PNR, PWR, PPR, PMR, PVR, PHR	RUN	YES
STATUS RECALL	PSR, MSR, ISR, OSR	RUN	YES
DISPLAY SELECT	MGD	RUN/CAL	NO
DISPLAY SELECT	MND, MPD, MMD	RUN	YES
UNITS SELECT	UxD	RUN	YES
UNITS SELECT	UUE/UUR	CAL	NO
PRINT	PRD	RUN	YES
CAPACITY/RES	CPE/CPR, REE/RER	CAL	NO
CALIBRATION	ZRD, RxD, LxE, ZFE/ZFR, LXE/LXR, LFE/LFR, LCE/LCR, HCE, HFE/HFR	CAL	NO
SETUP	SUE/SUR, FLE/FLR, P2E/P2R, INE/INR, TME/TMR, DTE/DTR, TIE/TIR, PAE/PAR, ANE/ANR, TNE/TNR	CAL	-
TEMPERATURE CAL	TPD, TXD, TRD, TFR, RZD, RSD, HxD, CxD, TxE/TxR	CAL	NO

➤ Protocol of responses:

- ◆ Direct cmd code: cmd = \*<cmdD><CR>

RESPONSE	VALID ENTRY	INVALID ENTRY	CAN NOT PERFORM
(NONE) =	(NONE)	(NONE)	(NONE)
(ECHO) =	:<cmd D><CR>	:NAK<CR>	:NAC<CR>
(ACK) =	:ACK <CR>	:NAK<CR>	:NAC<CR>
- ◆ Data request code: cmd = \*<cmdR><CR>

RESPONSE	VALID ENTRY	INVALID ENTRY	CAN NOT PERFORM
(NONE) =	:<cmdR><{data}><CR>	(NONE)	(NONE)
(ECHO) =	:<cmdR><{data}><CR>	:NAK<CR>	:NAC<CR>
(ACK) =	:<cmdR><{data}><CR>	:NAK<CR>	:NAC<CR>
- ◆ Data entry code: cmd = \*<cmdE><{data}><CR>

<u>RESPONSE</u>	<u>VALID ENTRY</u>	<u>INVALID ENTRY</u>	<u>CAN NOT PERFORM</u>
(NONE) =	(NONE)	(NONE)	(NONE)
(ECHO) =	:<cmdE><CR>	:NAK<CR>	:NAC<CR>
(ACK) =	:ACK<CR>	:NAK<CR>	:NAC<CR>

## 6.0 CHECK OPTION:

The check option is setup in the print duplex mode of port 1. It can be applied to the duplex serial in the RS485 mode or in non addressable mode.

If check setup is set for 'NONE' (OFF), no characters are transmitted for check.

Checksum: if checksum is selected the check consists of two ASCII characters.

- ◆ All ASCII characters including the starting character and terminating character preceding the checksum is included in the checksum.
- ◆ The ASCII characters are binary summed (not including the parity bit).
- ◆ The least significant byte is divided into four bits each "nibbles" and 30H is added to each. Therefore a sum of 5EH will be transmitted as 35H and 3EH or '5>'.

Xor: if exclusive or is selected the check consists of two ASCII characters.

- ◆ All ASCII characters preceding the checksum are exclusively or'ed together.
- ◆ The check byte is then calculated to give a result of zero when it is exclusively or'ed in.
- ◆ The check byte is divided into four bits each and 30H is added to each.

## 7.0 RS485:

The RS485 protocol is the same as the standard duplex except the two character destination address and two character origin address is included after the starting character.

The host computer's address is fixed at '00' and the DLR address can be set between 1 and 98.

When the setup is not set for the RS485 mode the RS485 transceiver is set for transmit only (RS422 applications).

## 8.0 COMMAND CODE SUMMARY:

The Response is shown in the 'Ack/Nak' mode.

The 'D' column represents the data character length including the '[' separator but not the '{'or'}' brackets.

COMMAND CODE SUMMARY TABLE II			
COMMAND	RESPONSE	D	DESCRIPTION
<b>GENERAL:</b>			
ZED	ACK	-	Zero.
TAD	ACK	-	Tare. ;later
<b>WEIGHT/PRESSURE/RATE DATA RECALL:</b>			
PDR	PDR {pr,units,par,stat}	11	Display data recall.
PGR	PGR {pr,units,par,stat}	11	Pressure recall.
PVR	PVR {pr,units,par,stat}	11	R.P.M. recall
PHR	PHR {pr,units,par,stat}	11	HP recall
PNR	PNR {pr,units,par,stat}	11	ΔT recall. ;later
PPR	PPR {pr,units,par,stat}	11	Max data recall.
PMR	PMR {pr,units,par,stat}	11	Min data recall.
<b>STATUS RECALL:</b>			
PSR	PSR {stat}	1	Pressure status recall (motion, etc.)
MSR	MSR {units,mode}	3	Unit/mode status recall.
ISR	ISR {I1 I2}	3	Input status recall.

COMMAND CODE SUMMARY TABLE II			
COMMAND	RESPONSE	D	DESCRIPTION
OSR	OSR {o1 o2}	3	Output status recall. ;later
<b>DISPLAY:</b>			
MPD	ACK	-	Display to Max mode. ;later
MMD	ACK	-	Display to Min mode. ;later
<b>UNITS:</b>			
UxD	ACK	-	Conv. Select units (x=A,B,C etc. per Table III)
UUE {unit1 unit2}	ACK	1	Base 'Cal' units entry.
UUR	UUR {unit1 unit2}	3	Base 'Cal' units recall.
<b>PRINT:</b>			
PRD	ACK	-	Print to printer Port 2. ;later
<b>CAPACITY:</b>			
CPE {cap}	ACK	6	Capacity entry.
CPR	CPR {cap}	6	Capacity recall.
REE {res}	ACK	5	Resolution entry.
RER	RER {res}	5	Resolution recall.
<b>CALIBRATION:</b>			
ZCD	ACK	6	Perform zero cal.
RxD	ACK		Perform linear reset at span x; Where x is a # from 1 – 9 or letter 'a'.
HCE {data}	ACK	166	Perform hysteresis correction.
LxE {data}	ACK	6	Perform linear cal at point x; Where x is a # from 1 – 9 or the letter 'a' (linear on).
ZFE {x1 c1}	ACK	17	Zero cal correction entry.
ZFR	ZFR {x1 c1}	17	Zero cal correction recall.
LXE {x1 ---x9 xA}	ACK	89	Span cal linear corr. All X's entry.
LXR	LXR {x1 ---x9 xA}	89	Span cal linear corr. All X's recall.
LFE {x1 ---x9 xA}	ACK	89	Span cal linear corr. All S's entry.
LFR	LFR {x1 ---x9 xA}	89	Span cal linear corr. All S's recall.
LCE {x1 ---x9 xA}	ACK	89	Span cal linear corr. All C's entry.
LCR	LCR {x1 ---x9 xA}	89	Span cal linear corr. All C's recall.
HFE {x1 c1}	ACK	17	Hysteresis (X and C) corr. Entry.
HFR	HFR {x1 c1}	17	Hysteresis (X and C) corr. Recall.
<b>SETUP DATA:</b>			
SUE {d/s ---min}	ACK	13	
SUR	SUR {d/s ---min}	13	Main pressure setup recall.
FLE {fil}	ACK		Filter setup entry.
FLR	FLR {fil}		Filter setup recall.
INE {I1 I2}	ACK		Input setup entry.
INR	INR {I1 I2}		Input setup recall.
P2E {s1 ---s7}	ACK		Port 2 serial setup entry.
P2R	P2R {s1 ---s7}		Port 2 serial setup recall.
TME {hhmm}	ACK		Time entry.
TMR	TMR {hhmm}		Time recall.
DTE {mmddy}	ACK		Date entry.
DTR	DTR {mmddy}		Date recall.
TIE {time/date}	ACK		Time and Date setup entry.

COMMAND CODE SUMMARY TABLE II			
COMMAND	RESPONSE	D	DESCRIPTION
TIR	TIR {time/date}		Time and Date setup recall.
PAE {p1}	ACK		Parrallel I/O setup entry.
PAR	PAR {p1}		Parrallel I/O setup recall.
ANE {anlg 1 ---sp adj}	ACK		Analog setup entry.
ANR	ANR { anlg 1 ---sp adj }		Analog setup recall.
TNE { }	ACK		Setpoint (Trip point) entry
TNR	TNR { }		Setpoint (Trip point) recall
<b>TEMPERATURE CAL:</b>			
TPD	ACK	-	Temperature Cal on.
TXD	ACK	-	Temperature Cal off.
TRD	ACK	-	Temperature Cal Reset.
TFR	TFR {t data}	8	Temperature reading (current) recall.
RZD	ACK	-	Zero Temp Reference acquire.
RSD	ACK	-	Span Temp Reference acquire.
HxD	ACK	-	Zero Temp Hot acquire (x=1,2 or 3).
HxD	ACK	-	Span Temp Hot acquire (x=X,Y or Z).
CxD	ACK	-	Zero Temp Cold acquire(x=1,2 or 3).
CxD	ACK	-	Span Temp Cold acquire(x=X,Y or Z).
DxE {---}	ACK		Temp. corrections entry (x=1 or 2).
DxR	DxR {---}		Temp. corrections recall (x=1 or 2).
TxR	TxR {---}		Temp. diag. data recall (x=1,2 or 3).

## 9.0 RECALLED DATA:

### COMMANDS:

**PDR** = Display data.  
**PGR** = Pressure data  
**PNR** = Delta Pressure. ;later  
**PPR** = Max data.  
**PMR** = Min data.

### RESPONSE DATA:

DATA FORMAT: <pr><unit1><unit2><par><stat>  
 LENGTH: fixed at 12 characters.  
 WHERE:

**pr:** Eight (8) character data field for pressure including polarity and decimal point.  
 Has "space" for positive data and "minus" (-) for negative data.  
**Unit1 & 2:** Two (2) characters (Refer to Table III and Table IV )

TABLE III			
Pressure 'unit 1' Assignment			
Unit 1	DESCRIPTION	Unit 1	DESCRIPTION
A	mmHgOEC	K	Kpa
B	BAR	L	Mbar

TABLE IV	
Pressure 'unit 2'	
Unit 2	DESCRIPTION
A	ABSOLUTE
G	GAGE



C	CmH <sub>2</sub> O	M	mmH <sub>2</sub> O4EC
D	inHgOEC	N	PASCAL
E	Kg/cm <sup>2</sup>	O	(SPARE)
F	FtseaH <sub>2</sub> O	P	PSI
G	inH <sub>2</sub> O60F	Q	(SPARE)
H	inH <sub>2</sub> O68F	R	(SPARE)
I	inH <sub>2</sub> O4EC	S	(SPARE)
J	MetrH <sub>2</sub> O	T	TORR

V	VAC (SPECIAL)
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**par:** one (1) character data field per Table V;

TABLE V	
'par' ASSIGNMENT	
<par>	DESCRIPTION
'sp'	Standard Pressure
N	Net (pressure with Tare)
T	Tare
H	HP
P	Max
M	Min
F	Freeze

**stat:** one (1) character data field;

I	= Invalid data	O	= Over range
U	= Under range	M	= Motion
C	= Center of zero	'Sp'	= None of the above

## 10.0 STATUS RECALLED:

### ➤ COMMANDS:

**PSR** = Pressure status (motion, etc).  
**MSR** = Unit/mode status  
**ISR** = Input status.  
**OSR** = Output status.

### ➤ Units/Mode status (**MSR** command)

DATA FORMAT: <unit1><unit2>|<mode>  
LENGTH: Fixed at 4 characters.  
WHERE:

**Unit1&2:** Two (2) character field. For character assignment refer to Table III & Table IV.

**par:** One (1) character field. For character assignment refer to Table VI.

TABLE VI	
'mode' ASSIGNMENT	
<mode>	DESCRIPTION
N	Standard
C	Cal/config

T	Temp
D	Diagnostic ;later

- Pressure status (**PSR** command)
  - DATA FORMAT: <stat>
  - LENGTH: Fixed at 1 character
  - WHERE:
    - stat:** one character data field;
    - I = invalid data
    - O = over range
    - U = under range
    - M = motion
    - C = center of zero
    - 'Sp' = none of the above
  
- Input status (**ISR** command):
  - DATA FORMAT: <i1>|<i2>
  - LENGTH: Fixed at 3 characters
  - WHERE:
    - i1** = input 1 status
    - i2** = input 2 status
    - 0 represents an open input (logic 1)
    - 1 represents a closed input (logic 0)
    - | = separation character.
  
- Output status (**OSR** command):
  - DATA FORMAT: <o1>|<o2>
  - LENGTH: Fixed at 3 characters
  - WHERE:
    - o1** = output 1 status
    - o2** = output 2 status
    - 0 represents an open output (logic 1)
    - 1 represents a closed output (logic 0)
    - | = separation character.

## 11.0 CAPACITY/RESOLUTION ENTRY AND RECALL:

- COMMANDS:
  - CPE{} / CPR** = Capacity.
  - REE{} / RER** = Resolution.
  
- Capacity DATA entry (**CPE{}** command) and recall (**CPR** command):
  - DATA FORMAT: <data>
  - LENGTH: Fixed at 6 characters.
  - WHERE: data: Six (6) character data field with no polarity and decimal point.
    - Entry with or without leading zero blanking.
    - Recall with leading zero blanking.
  
- Resolution DATA entry (**REE{}** command) and recall (**RER** command):
  - DATA FORMAT: <data>
  - LENGTH: Fixed at 5 characters.
  - WHERE: data: Five (5) character data field including decimal point when required.
    - On Entry and Recall, if a decimal point is included then use full leading zeros; if no decimal point is included then begin data with a space followed by leading zeros.

## 12.0 BASE UNITS ENTRY AND RECALL:

- COMMANDS:
  - UUE{} / UUR** = BASE UNITS ENTRY AND RECALL

- Cal Units DATA entry (**UUE{}** command) and recall ( **UUR** command)
  - FORMAT: <unit1><unit 2>
  - LENGTH: Fixed at two (2) characters.
  - WHERE:
    - unit1** : Table III (P=PSI, etc.).
    - unit2** : Table IV (G=Gage,etc.).

## 13.0 CALIBRATION:

- General:
  - The unit must be set for Calibration (Mode Rocker switch 1 or 2 closed).
- COMMANDS:
  - ZCD** = Perform Zero Cal
  - RxD** = Perform Linear Reset at point x(x is # from 1 - 9 or letter 'A')
  - LxE{} / LXR** = Perform Linear Cal at point x ( x is a # from 1 - 9 or the letter 'A').
  - ZFE{} / ZFR** = Zero Cal correction.
  - LXE{} / LXR** = Span Cal linear corr. All X's.
  - LFE{} / LFR** = Span Cal linear corr. All S's.
  - LCE{} / LCR** = Span Cal linear corr. All C's.
  - HCE{} / HFR** = Perform Hysteresis cal.
  - HFE{} / HFR** = Hysteresis correction.
- Calibration 'Perform' command data entry:
  - COMMANDS: **LxE{} , HCE{} / HFR**
  - DATA FORMAT: <data>
  - LENGTH: Fixed at 6 characters.
  - WHERE: data: Six (6) character data field with leading zeros and no decimal point.
  - EXAMPLE: 10.00 PSI entered as {001000}
- Calibration 'Correction' command data entry and recall:
  - ◆ Zero Cal and Hysteresis correction data;
    - COMMANDS: **ZFE{} / ZFR, HFE{} / HFR**
    - DATA FORMAT: <x1>|<c1>
    - LENGTH: Fixed at 17 characters.
    - WHERE: x1, c1 = Eight (8) character data fields each.
  - ◆ Span Cal Linear corrections (all X's,S's, C's) commands entry and recall data:
    - COMMANDS: **LXE{} / LXR, LFE{} / LFR, LCE{} / LCR**
    - DATA FORMAT: <x1><|><x2><|><x3><|><x4><|><x5><|><x6><|><x7><|><x8><|><x9><|><xA>
    - LENGTH: Fixed at 89characters.
    - WHERE: x1 - xA: Eight (8) character data field each.

## 14.0 SETUP DATA:

### 14.1 GENERAL:

- ◆ FORMAT: <par 1>|<par 2>| - - - <par x>
- ◆ Setup data is set in a string using the separation character '|' between parameters.
- ◆ The parameters are listed in the order of the function diagram as they appear in the manual.
- ◆ 'Arrow' select parameters are represented as a number starting with '0'.
- ◆ Numeric entered data is directly represented by its data value.
- ◆ When entering setup data, the full string of parameters need not be entered.

### 14.2 COMMANDS:

- SUE{} / SUR** = Main Pressure setup.
- FLE{} / FLR** = Filter setup.
- P1E{} / P1R** = Port 1 serial setup.

**P2E{} / P2R** = Port 2 serial setup.  
**INE{} / INR** = Input setup.  
**TME{} / TMR** = Time.  
**DTE{} / DTR** = Date.  
**TIE{} / TIR** = Time/Date Setup  
**PAE{} / PAR** = Parallel I/O setup  
**ANE{} / ANR** = Analog setup.

**14.3 PRESSURE:**

**COMMAND:** **SUE{} / SUR**  
**DATA FORMAT:** <d/s>|<ze%>|<z+%>|<azm>|<mot>|<ze set>|<min>  
**LENGTH:** Fixed at 13 characters.  
**WHERE:**  
**d/s** = Display per Second update rate fixed at 1 number code..  
**ze%** = Zero Aperature % of FS ( Zero %) fixed at 1 number code.  
**z+%** = Zero Band in % of FS (Zero+/-%) fixed at 1 number code.  
**azm** = AZM Band in divisions (AZM +/-) fixed at 1 number code.  
**mot** = Motion Band in divisions (Motion) fixed at 1 number code.  
**ze set** = Auto Tare or Fixed Offset Zero Set) fixed at 1 number code.  
**min** = Minimum Mode enable (Min) fixed at 1 number code.  
**Note: The following parameters are not included:**  
**max** = Max Mode enable (Max) fixed at 1 number code  
**frez** = Freeze mode select.

CODE # / PARAMETER ASSIGNMENT							
CODE #	DSP/ SEC	ZERO %	ZERO +/-%	AZM+/-	MOT ION	ZERO Set	MIN
0	AUT O	OFF	FULL	OFF	OFF	OFF	OFF
1	2	0.5	0.05	0.5	1	Auto Tare	ON
2	3	1	0.1	1	3	OffSet	
3	5	2	0.2	3	5		
4		5	0.5	5	10		
5		100	1	10	20		
6			1.5		50		

**14.4 FILTER SETUP:**

**COMMAND:** FLE/FLR  
**DATA FORMAT:** <code>  
**LENGTH:** Fixed at 2 characters.  
**WHERE:**  
**code** = Two (2) digit Filter code # from 00 to 20 per table below.

CODE # / FILTER PARAMETER ASSIGNMENT (FILTR1)									
CODE#	FILTR 1	CODE#	FILTR 1	CODE#	FILTR 1	CODE#	FILTR 1	CODE#	FILTR 1
00	1	05	6	10	12	15	25	20	50
01	2	06	7	11	14	16	30		

02	3	07	8	12	16	17	35		
03	4	08	9	13	18	18	40		
04	5	09	10	14	20	19	45		

EXAMPLE: A filter setting of 14 would be \*FLE{11}<cr>

**14.5 PORT 1 SERIAL SETUP:**  
**Not supported at this time.**

**14.6 PORT 2 SERIAL SETUP:**

COMMAND: P2E/P2R  
DATA FORMAT: <mode>|<del>|<t&d>|<data>|<eol>|<sot>|<eot>  
LENGTH: Fixed at 15 characters.  
WHERE: (all codes fixed at one (1) number code; see code tables below)

**mode** = Format mode select.  
**del** = Delay select.  
**t&d** = Time and Date.  
**data** = Data select.  
**eol** = End of line terminator.  
**sol** = Start of text character.  
**eot** = End of text character.

CODE # PORT 2 PARAMETER ASSIGNMENT							
CODE#	MODE	DELAY	T & D	DATA	EOL	SOT	EOT
0	STD	AUTO	OFF	DISP	CR/LF	STX	NONE
1	MOD	1 SEC	ON	GTN	CR	NONE	EOT
2	CUST	2 SEC	ABOVE			SOH	ETX
3		3 SEC	BELOW				FF
4		4 SEC					LF
5		5 SEC					

**14.7 INPUT SETUP:**

COMMAND: INE/INR  
DATA FORMAT: <I1>|<I2>  
LENGTH: Fixed at 3 characters.  
WHERE: (all codes fixed at one (1) number code; see code table below)

**I1** = Input #1  
**I2** = Input #2

CODE # INPUT 1 and 2 PARAMETER ASSIGNMENT	
CODE#	MODE
0	OFF
1	Freeze
2	Zero
3	Tare
4	Print

## 14.8 TIME/DATE SETUP:

COMMAND: TIE/TIR  
 DATA FORMAT: <t1>|<t2>|<t3>  
 LENGTH: Fixed at 5 characters.  
 WHERE: (all codes fixed at one (1) number code; see code table below)  
     **t1** = 12 hour or 24 hour select.  
     **t2** = Date format select.  
     **t3** = Date number or letter select

TIME/DATE PARAMETER ASSIGNMENT			
CODE#	T1	T2	T3
0	24 HR	MM/DD/YY	NUMBER
1	12 HR	DD/MM/YY	LETTER

## 14.9 PARALLEL SETUP:

COMMAND: PAE/PAR  
 DATA FORMAT: <par>  
 LENGTH: Fixed at 1 character.  
 WHERE: par: code fixed at one (1) number code; see code table below

CODE # PARALLEL PARAMETER ASSIGNMENT	
CODE#	MODE
0	Parallel OFF
1	Parallel ON

## 14.10 ANALOG SETUP:

COMMAND: ANE{}/ANR  
 DATA FORMAT: <anlg 1>|<anlg 2>|<anlg 3>|<zero>|<fs>|<zr adj>|<sp adj>  
 LENGTH: Fixed at characters.  
 WHERE:  
     **anlg 1** = Analog Option select.  
     **anlg 2** = 10 or 5 volt output  
     **anlg 3** = Select type of data for the analog output.  
     **zero** = Zero offset entry.  
     **fs** = Full scale entry.  
     **zr adj** = Zero adjust entry.  
     **sp adj** = Span adjust entry.

CODE # / PARAMETER ASSIGNMENT							
CODE#	anlg 1	anlg 2	anlg 3	Zero	fs	zr adj	sp adj
0	ANLG OFF	10 volts	PRESSURE	xxxxxxx x	xxxxxxx x	xxxxxxxxx	xxxxxxx x
1	ANLG ON	5 volts	DELTA T				

## 14.11 SETPOINT (TRIP POINT) SETUP:

COMMAND: TNE{}/TNR  
 DATA FORMAT: <trip>|<disp>|<recall>|<trip1>|<type1>|<tp1>|<tp1H>|<tp1L>|<h1H>|<hy1H>|<h1L>|<hy1L>|<trip2>|<type2>|<tp2>|<tp2H>|<tp2L>|<h2H>|<hy2H>|<h2L>|<hy2L>  
 LENGTH: Fixed at characters.  
 WHERE:

**trip** = Setpoint (Trip Point) Option select.  
**disp** = Display indication  
**recall** = Trip point status.  
**TRIP 1** **TRIP 2**  
**trip1** **trip2** = Trip point enable  
**type1** **type2** = Trip point type  
**tp1** **tp2** = Trip point polarity  
**tp1H** **tp2H** = Trip point high value of eight (8) digits with leading zeros and no decimal point.  
**tp1L** **tp2L** = Trip point low value of eight (8) digits with leading zeros and no decimal point.  
**h1H** **h2H** = Trip point high hysteresis polarity  
**hy1H** **hy2H** = Trip point high hysteresis value of six (6) digits with leading zeros and no decimal point.  
**h1L** **h2L** = Trip point low hysteresis polarity  
**hy1L** **hy2L** = Trip point low hysteresis value of six (6) digits with leading zeros and no decimal point.

CODE # / PARAMETER ASSIGNMENT 1 of 2							
COD E#	trip	disp	recall	trip1 & trip2	type1 & type2	tp1 & tp2	
0	OFF	TRIP	NONE	OFF	TRIP PT	UNDER	
1	ON	ACCEPT	VIEW	ON	BAND	OVER	
2			MODIFY				

CODE # / PARAMETER ASSIGNMENT 2 of 2							
COD E#	tp1H & tp2H	tp1L & tp2L	h1H & h2H	hy1H & hy2H	h1L & h2L	hy1L & hy2L	
0	xxxxxxx x	xxxxxxx x	DESCEND	xxxxxxx	DESCEND	xxxxxxx	
1			ASCEND		ASCEND		

## 15.0 TEMPERATURE CALIBRATION:

### ➤ COMMANDS:

**TPD** = Temperature Cal on.  
**TXD** = Temperature Cal off.  
**TRD** = Temperature reset.  
**TFR** = Temperature reading.  
**RZD** = Zero Temp Reference acquire.  
**RSD** = Zpan Temp Reference acquire..  
**HxD** = Zero Temp Hot acquire (x=1,2 or 3).  
**HxD** = Span Temp Hot acquire (x=X,Y or Z).  
**CxD** = Zero Temp Cold acquire.  
**CxD** = Span Temp Cold acquire.  
**DxE{}/DxR** = Temperature corrections (x=1 or 2).  
**TxR** = Temperature diagnostic data recall (x=1,2 or 3).

### ➤ TEMPERATURE READING RECALL:

**COMMAND:** **TFR**  
**DATA FORMAT:** <t data>  
**LENGTH:** Fixed at 8 characters  
**WHERE:** <t data> = eight (8) character data field (temp data not in calibrated standard units).

➤ **TEMPERATURE CORRECTIONS DATA ENTRY AND RECALL:**

COMMANDS: **D1E/D1R** and **D2E/D2R**

DATA FORMAT (1): <zr>|<zl1>|<zl2>|<zl3>|<zh1>|<zh2>|<zh3>|<sr>|<sl1>|<sl2>|<sl3>|<sh1>|<sh2>|<sh3>

DATA FORMAT (2): <tr>|<tl1>|<tl2>|<tl3>|<th1>|<th2>|<th3>|<fzl1>|<fzl2>|<fzl3>|<fsl1>|<fsl2>|<fsl3>|<fzh1>|<fzh2>|<fzh3>|<fsh1>|<fsh2>|<fsh3>

DATA LENGTHS: Part (1)=Fixed at 126 characters  
Part (2)=Fixed at 171 characters

WHERE (all parameters eight (8) characters in length):

<b>zr</b>	=	Zero Reference
<b>zl1/2/3</b>	=	Zero low temperature a/d readings.
<b>zh1/2/3</b>	=	Zero high temperature a/d readings.
<b>sr</b>	=	Span Reference
<b>sl1/2/3</b>	=	Span low temperature a/d readings.
<b>sh1/2/3</b>	=	Span high temperature a/d readings
<b>tr</b>	=	Reference temperature
<b>tl1/2/3</b>	=	Low cal temperatures.
<b>th1/2/3</b>	=	High cal temperatures.
<b>fzl1/2/3</b>	=	Zero functions at low temperatures.
<b>fsl1/2/3</b>	=	Span functons at low temperatures.
<b>fzh1/2/3</b>	=	Zero functions at high temperatures.
<b>fsh1/2/3</b>	=	Span functions at high temperatures.

➤ **TEMPERATURE DIAGNOSTICS DATA RECALL:**

COMMANDS: **T1R ,T2R and T3R**

DATA FORMAT (1): <zc>|<sc>|<wa>|<ftl>|<ftl2>|<ftl3>|<fth>|<fth2>|<fth3>|<zr>|<zl1>|<zl2>|<zl3>|<zh1>|<zh2>|<zh3>

DATA FORMAT (2): <sr>|<sl1>|<sl2>|<sl3>|<sh1>|<sh2>|<sh3>|<tr>|<tl1>|<tl2>|<tl3>|<th1>|<th2>|<th3>

DATA FORMAT (3): <fzl1>|<fzl2>|<fzl3>|<fsl1>|<fsl2>|<fsl3>|<fzh1>|<fzh2>|<fzh3>|<fsh1>|<fsh2>|<fsh3>

LENGTH: Part (1)= Fixed at 143 characters  
Part (2)= Fixed at 125 characters  
Part (3)= Fixed at 107 characters

WHERE (all parameters eight (8) characters in length):

<b>zr</b>	=	Zero Reference
<b>zl1/2/3</b>	=	Zero low temperature a/d readings.
<b>zh1/2/3</b>	=	Zero high temperature a/d readings.
<b>sr</b>	=	Span Reference
<b>sl1/2/3</b>	=	Span low temperature a/d readings.
<b>sh1/2/3</b>	=	Span high temperature a/d readings
<b>tr</b>	=	Reference temperature
<b>tl1/2/3</b>	=	Low cal temperatures.
<b>th1/2/3</b>	=	High cal temperatures.
<b>fzl1/2/3</b>	=	Zero functions at low temperatures.
<b>fsl1/2/3</b>	=	Span functons at low temperatures.
<b>fzh1/2/3</b>	=	Zero functions at high temperatures.
<b>fsh1/2/3</b>	=	Span functions at high temperatures.

16.0 **COMMAND CODE ALPHABETICAL (xxD=COMMAND, xxR=RECALL & XxE=ENTRY):**

AxE / AxR	=	Fill Preact
CPE / CPR	=	Capacity.
CxD	=	Zero Temp Cold acquire (x=1,2 or 3).
CxZ	=	Span Temp Cold acquire (x=X,Y or Z).



DTE / DTR = Date.  
DxE / DxR = Temperature Corrections entry and recall (x=1 or 2)  
FLE / FLR = Filter setup.  
HCD = Perform Hysteresis cal.  
HFE/HFR = Hysteresis correction.  
HNE/HNR = RPM/HP setup data.  
HxD = Span Temp Hot Acquire.(x=X,Y or Z).  
HxD = Zero Temp Hot Acquire (x=1,2 or 3).  
INE / INR = Input setup.  
ISR = Input status.  
LCE / LCR = Span Cal Linear corr. All C's.  
LFE / LFR = Span Cal Linear corr. All S's.  
LxE = Perform Linear Cal at point x; Where x is a # from 1 - 9 or A  
LXE / LXR = Span Cal Linear corr. All X's.  
MGD = Display to pressure mode. ;later  
MMD = Display to min mode. ;later  
MND = Display to net mode. ;later  
MPD = Display to max mode. ;later  
MSR = Unit/mode status  
OSR = Output status.  
PAE/PAR = Parallel I/O setup.  
PDR = Display data.  
PGR = Pressure data.  
PHR = HP data  
PMR = Min data.  
PNR = Applied tare. ;later  
PPR = Max data.  
PRD = Print to printer port 2.  
PSR = Pressure status (motion, etc).  
P2E / P2R = Port 2 serial setup.  
REE / RER = Resolution.  
RSD = Span temp reference acquire.  
RxD = Linearization Reset (x = 1-9 or A)  
RZD = Zero temp reference acquire.  
SUE/SUR = Main Pressure setup.  
TAD = Tare. / is function of motion etc. :later  
TFR = Temperature reading.  
TIE/TIR= Time and Date setup.  
TME / TMR = Time.  
TNE / TNR = Setpoint (Trip Point) setup  
TPD = Temperature cal on.  
TRD = Temperature reset.  
TXD = Temperature cal off.  
TxR = Temperature disgnostic recall (x=1,2 or 3)  
UUE/UUR = Base 'cal' units config  
UxD = Select units  
ZCD = Perform Zero Cal.  
ZED = Zero.  
ZFE / ZFR = Zero cal correction.