Computers and Control Systems: Pinout Values and Diagnostic Parameters

Reference Value Symptom Chart

The Reference Value Symptom Chart is used to provide guidance in selecting the appropriate parameter identification (PID) or measured signal related to the fault area. Select a symptom from the symptom chart along with the category number and go to the PID/Measured Signal Chart. For multiple symptoms, select the symptom that is the most evident.

Symptom Chart

Symptom Occurs During	Symptom	Category Number
Startup:	No start/Normal crank	1
	Hard start/Long crank	2
	Stall after start	3
	Diesels/Runs on	4
Idle:	MIL	5
	Stalls/Quits	6
	Slow	7
	Slow return	8
	Rolling	9
	Fast	10
	Rough	11
	Misses	12
	Backfires	13
Acceleration:	Stalls/Quits	6
	Misses	12
	Bucks/Jerks	14
	Backfires	13
	Hesitation	15
	Lack/Loss of power	16
	Surge	17
	Spark knock	18
	Cooling system temperature	19
	Poor fuel economy	20
	Emissions compliance	21
Cruise:	Stalls/Quits	6
	Misses	12
	Bucks/Jerks	14
	Backfires	13
	Lack/Loss of power	16
	Surge	17
	Spark knock	18
	Cooling system temperature	19
	Poor fuel economy	20

(Continued)

Reference Value Symptom Chart (Part 1)

Reference Value Symptom Chart

Symptom Occurs During	Symptom	Category Number
	Emissions compliance	21
Deceleration:	Stalls/Quits	6
	Backfires	13
Transmission Operation: (Automatic)	Shift/engagement concerns	22
	No overdrive	23

Reference Value Symptom Chart (Part 2)

Reference Value Parameter Identification (PID)/Measured Signal Chart

The following listing reflects PIDS and/or measured values which may reveal a possible concern within each system shown. Match the category number with the related PID/measured signal and go to the Typical Diagnostic Reference Value Charts.

PID/Measured Signal Chart

Category Number	Related PIDS/Measured Signals
5-9-10-17	ACCR (WAC)
5-9-10-17	ACCS
5-10-17	ACP
5-10-17	ACP V
5-21	AIR
5-21	AIRF
5-21	AIRM
1-23	APP1
1-23	APP2
1-23	APP3
23	BPP (BOO)
18-19	CHT
18-19	CHT V
1-2-3-5-6-7-11-12-13-14-15-16-17-20-21	CMP
1-2-3-5-6-7-11-12-13-14-15-16-17-20-21	CKP
1-2-3-5-6-7-11-12-13-14-15-16-17-20-21	CMP1/2
10	CPP/PNP
3-5-6-7-9-11-15-16-20-21	DPFEGR
4-18-19-21-22	ECT*
4-18-19-21-22	ECT V
3-5-6-7-9-11-15-16-20-21	EGRMC1-4
3-5-6-7-9-11-15-16-20-21	EGRMDSD
3-5-6-7-9-11-15-16-20-21	EGRVR
5-18-19-20-21	EOT
5-18-19-20-21	EOT V
22	EPC/EPC1/EPC2/EPC3
22	EPC V
3-5-6-11-21	EVAPC V
3-5-6-11-21	EVAPPDC
3-5-6-11-21	EVMV
19	FCV 3
20	FLI (H)
20	FLI V
1 thru 21	FP
1 thru 21	FPM or FP M
1 thru 21	FRP

(Continued)

Reference Value Parameter Identification (PID)/Measured Signal Chart (Part 1)

Reference Value Parameter Identification (PID)/Measured Signal Chart

PID/Measured Signal Chart

Category Number	Related PIDS/Measured Signals
1 thru 21	FRP V
1 thru 21	FRT
5	FTP
5	FTP V
1 thru 21	FUELPW1/2
1 thru 21	FUELSYS (OL/CLSD-LP)[a]
22-23	GEAR
5	GENFDC/GENRC
5	GFS/GENLI
19	HFC (FC3)
1 thru 21	HTR11/12/13/21/22
1 thru 21	IAC
2-3-5-7-8-10-22	IAT[a]
2-3-5-7-8-10-22	IAT2[a]
2-3-5-7-8-10-22	IAT V[a]
2-3-5-7-8-10-22	IAT2 V[a]
5-14-15-16-17-20	IMRC
5-14-15-16-17-20	IMRCM
5-14-15-16-17-20	IMTV
6-11-12-14 thru 18-20-21	INJ x F
4-5-16-18-19-20-21	KS1[a]
4-5-16-18-19-20-21	KS2[a]
19	LFC (FCI)
1 thru 21	LONGFT1/2[a]
1 thru 23	MAF[a]
1 thru 23	MAF V
1 thru 23	MAP V
1 thru 22	MISF
1 thru 21	HO2S11/12/13/21/22
15-18-20-21	OCTADJ
22	OSS
10	PSP
10	PSPT
10	PSP V
5	PTO
1 thru 23	RPM[a]
5-14-16-17	SCBC
5-14-16-17	SCIPC
1 thru 21	SHRTFT1/2/11/12/21/22

(Continued)

Reference Value Parameter Identification (PID)/Measured Signal Chart (Part 2)

Reference Value Parameter Identification (PID)/Measured Signal Chart

PID/Measured Signal Chart

Category Number	Related PIDS/Measured Signals
15-16-18-19-20-21	SPRKADV[a]
22-23	SS1(SSA)/SS2(SSB)/SS3(SSC)/SS4(SSD)
1-23	TACM (-)
1-23	TACM (+)
6-14-16-20	TCC
22	TCIL
22-23	TCS
22-23	TFT
22-23	TFT V
1-23	TP
1-23	TP1 NS
1-23	TP2 PS
1-23	TP V
22-23	TR
22-23	TR 1-4
22-23	TR V
22-23	TR D
22-23	TSS
2-4-5-9-10-11-16-17-18-19-20-21	VCT
2-4-5-9-10-11-16-17-18-19-20-21	VCT1/2
1-2-3-5-6-11-12-13-14	VPWR
22-23	VSS

a Generic PID

Some signals can only be measured and will require the use of a digital multimeter (DMM).

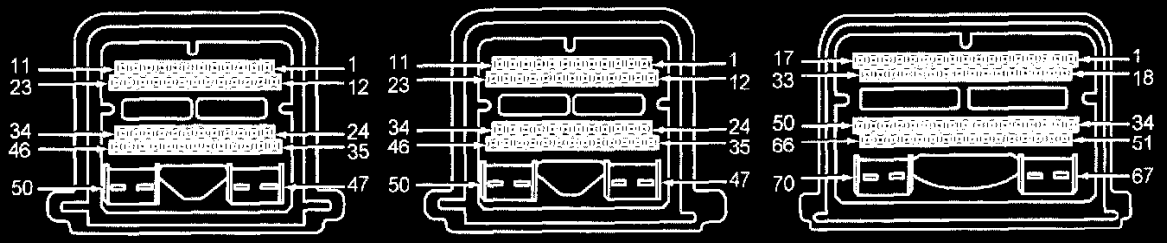
Reference Value Parameter Identification (PID)/Measured Signal Chart (Part 3)

Typical Diagnostic Reference Values

TYPICAL DIAGNOSTIC REFERENCE VALUES

5.4L 2V E-Series

170 PIN PCM HARNESS CONNECTOR



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Typical Diagnostic Reference Values

Sensors/Inputs	PCM Pin/PID only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
FTP V/FTP (M)	B3	2.6/0	2.6/0	2.6/0	2.6/0	DCV/IN-H2O
APP1	B5	4.1	4.2	3.9	3.7	DCV
PTOIR V (5R110W)	B7	VBAT	VBAT	VBAT	VBAT	DCV
BPP	B8	0.1/OFF	VBAT/ON (E)	0.1/OFF	0.1/OFF	DCV/OFF-ON
PTO LOAD (5R110W)	B9	NO	NO	NO	NO	YES-NO
APP2	B17	1.64	1.72	1.9	2.1	DCV
SCCS	B19	5	0.1 (P)	5	5	DCV
RDI	B20	0	0	0	0	DCV
FPM	B21	0.1-VBAT/ 0-100	0.1-VBAT/ 0-100	0.1-VBAT/ 0-100	0.1-VBAT/ 0-100	DCV/%
PTO (5R110W)	B26	OFF	OFF	OFF	OFF	OFF-ON
TCS	B27	0.1/OFF	VBAT/ON (G)	0.1/OFF (G)	0.1/OFF (G)	DCV/OFF-ON
APP3	B28	1	1.1	1.3	1.5	DCV
4X4L (5R110W)	B33	VBAT	VBAT	VBAT	VBAT	DCV
FEPS	B44	0.5-0.6	0.5-0.6	0.5-0.6	0.5-0.6	DCV
ACCS	E4	0.1/OFF	VBAT/ON (A)	0.1/OFF	0.1/OFF	DCV/OFF-ON
FRT	E19	0.5-3/210-110	0.5-3/210-110	0.5-3/210-110	0.5-3/210-110	DCV/DEG
DPFEGR (M)	E21	0.25-1.3	0.25-1.3	0.25-4.65	0.25-4.65	DCV
IAT (K)	E22	1.7-3.5/120-50	1.7-3.5/120-50	1.7-3.5/120-50	1.7-3.5/120-50	DCV/DEG
MAF V	E25	0	0.85-0.9	1-1.6	1.7-2.4	DCV
HO2S11	E28	0	switching (C)	switching (C)	switching (C)	DCV
HO2S21	E29	0	switching (C)	switching (C)	switching (C)	DCV

(Continued)

Typical Diagnostic Reference Values (Part 1)

5.4L 2V E-Series

Sensors/Inputs	PCM Pin/PID only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
FRP	E32	3.0/40	2.8/40	2.8/40	2.8/40	DCV/PSI
CHT V/CHT	E41	0.6 or 3.7/194	0.6 or 3.7/194	0.6 or 3.7/194	0.6 or 3.7/194	DCV/DEG
CMP	E45	0	5-8	9-12	13-17	Hz
CKP	E47	0	410	600-800	900-1125	Hz
KS	E49	0	0	0	0	DCV
TP2 PS	E60	1.2	0.8	1	1.4	DCV
TP1 NS	E61	4.3	4.6	4.5	4.4	DCV
BPS	E65	VBAT/OFF	0.1/ON (E)	VBAT/OFF	VBAT/OFF	DCV/OFF-ON
OSS	T3	0	0	120/1200	228/2280	Hz/RPM
ISS (5R110W)	T4	0	365-380/ 680-720	595/1000	1070/2060	Hz/RPM
TSS	T15	0	325/610	740/925	945/1660	Hz/RPM
TR1 (4R75E)	T16	0	0	11.5	11.5	DCV
TR2 (4R75E)	T17	0	0	11.5	11.5	DCV
TR-P (5R110W)	T19	ON	ON	OFF	OFF	ON-OFF
HO2S12 (M)	T24	0	(D)	(D)	(D)	DCV
HO2S22 (M)	T25	0	(D)	(D)	(D)	DCV
TR V/TR (4R75E)	T27	0/PARK	0/PARK	1.7/OD	1.7/OD	DCV/MODE
TR4 (4R75E)	T28	0	0	11.5	11.5	DCV
TFT	T29	0.5-2/210-110	0.5-2/210-110	0.5-2/210-110	0.5-2/210-110	DCV/DEG
CPP/PNP	PID	ON	ON	OFF	OFF	OFF-ON
FLI V/FLI (H)	PID	50	50	50	50	%
GEAR (4R75E)	PID	1	1	4	4	GEAR
GEAR (5R110W)	PID	1	1	5	6	GEAR
LOAD	PID	0	15	21-28	30-38	%
MISF	PID	OFF	OFF	OFF	OFF	OFF-ON
OCTADJS	PID	NO RETARD	NO RETARD	NO RETARD	NO RETARD	NO RETARD/ RETARD
RPM	PID	0	720	1000-1150	1580-1680	RPM
VSS	PID	0	0	30	55	MPH

Actuators/Outputs	PCM Pin/PID only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
VSO	B1	0	0	65	125	Hz
SMC (5R110W)	B2	0	0	0	0	DCV

(Continued)

Typical Diagnostic Reference Values (Part 2)

5.4L 2V E-Series

Actuators/Outputs	PCM Pin/PID only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
FP	B12	VBAT/0	0.1/100	0.1/100	0.1/100	DCV/%
EVAPC V	B13	VBAT/0	VBAT/0	VBAT/0 (R)	VBAT/0 (R)	DCV/%
RLC (5R110W)	B24	OFF	OFF	OFF	OFF	ON-OFF
CTO (M)	B25	0	46	67	107	Hz
PTOIL (5R110W)	B42	OFF	OFF	OFF	OFF	ON-OFF
TCIL	B43	VBAT/OFF	VBAT/OFF	VBAT/OFF	VBAT/OFF	DCV/OFF-ON
EVAPPDC	E1	0	0-10/0-100	0-10/0-100	0-10/0-100	Hz/%
ACCR (WAC)	E3	VBAT/OFF	0.1/ON (A)	VBAT/OFF	VBAT/OFF	DCV/OFF-ON
CDH (CYL 8)	E9	VBAT	VBAT	VBAT	VBAT	DCV
CDF (CYL 5)	E10	VBAT	VBAT	VBAT	VBAT	DCV
CDD (CYL 2)	E11	VBAT	VBAT	VBAT	VBAT	DCV
CDB (CYL 3)	E12	VBAT	VBAT	VBAT	VBAT	DCV
CDG (CYL 4)	E14	VBAT	VBAT	VBAT	VBAT	DCV
CDE (CYL 6)	E15	VBAT	VBAT	VBAT	VBAT	DCV
CDC (CYL 7)	E16	VBAT	VBAT	VBAT	VBAT	DCV
CDA (CYL 1)	E17	VBAT	VBAT	VBAT	VBAT	DCV
TACM (+)	E34	3.7	VBAT	VBAT	VBAT	DCV
INJ2	E35	0	3.2-3.8	4-6.9	6.5-12	mS
INJ4	E36	0	3.2-3.8	4-6.9	6.5-12	mS
INJ6	E37	0	3.2-3.8	4-6.9	6.5-12	mS
INJ8	E38	0	3.2-3.8	4-6.9	6.5-12	mS
TACM (-)	E51	3.7	VBAT	VBAT	VBAT	DCV
INJ1	E52	0	3.2-3.8	4-6.9	6.5-12	mS
INJ3	E53	0	3.2-3.8	4-6.9	6.5-12	mS
INJ5	E54	0	3.2-3.8	4-6.9	6.5-12	mS
INJ7	E55	0	3.2-3.8	4-6.9	6.5-12	mS
EGRVR (M)	E63	VBAT/0	VBAT/0	(T)	(T)	DCV/%
HTR11	E69	0.1/ON (O)	0.1/ON	0.1/ON	0.1/ON	DCV/OFF-ON
HTR21	E70	0.1/ON (O)	0.1/ON	0.1/ON	0.1/ON	DCV/OFF-ON
EPC1 (5R110W)	T1	0	0	0	0	PSI
EPC2 (5R110W)	T2	0	0	0	0	PSI
EPC3 (5R110W)	T10	0	0	0	0	PSI
EPC4 (5R110W)	T11	0	0	0	0	PSI

(Continued)

Typical Diagnostic Reference Values (Part 3)

5.4L 2V E-Series

Actuators/Outputs	PCM Pin/PID only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
EPC5 (5R110W)	T12	30	30	12	15	PSI
EPC (4R75E)	T13	7/5	8.3/5	9.6/45	9.6/45	DCV/PSI
SSA (SS1) (4R75E)	T42	0.1/ON	0.1/ON	0.1/ON	0.1/ON	DCV/OFF-ON
SSB (SS2) (4R75E)	T43	VBAT/OFF	VBAT/OFF	0.1/ON	0.1/ON	DCV/OFF-ON
TCC (4R75E)	T46	0.2/100	VBAT/0	VBAT/0	0.3/90-100	DCV/%
HTR12 (M)	T47	0.2/ON (O)	0.2/ON	0.2/ON	0.2/ON	DCV/OFF-ON
HTR22 (M)	T48	0.2/ON (O)	0.2/ON	0.2/ON	0.2/ON	DCV/OFF-ON
TSPC (5R110W)	T49	VBAT	VBAT	VBAT	VBAT	DCV
CHTIL	PID	OFF	OFF	OFF	OFF	OFF-ON
LONGFT1	PID	(-)20-(+)20	(-)20-(+)20	(-)20-(+)20	(-)20-(+)20	%
LONGFT2	PID	(-)20-(+)20	(-)20-(+)20	(-)20-(+)20	(-)20-(+)20	%
MIL	PID	OFF	OFF	OFF	OFF	OFF-ON
SHRTFT1	PID	(L)	(-)10-(+)10	(-)10-(+)10	(-)10-(+)10	%
SHRTFT2	PID	(L)	(-)10-(+)10	(-)10-(+)10	(-)10-(+)10	%
SPARKADV	PID	0	16-20	29	32-36	DEG

Other	PCM Pin/PID only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
APPVREF	B4/16	5	5	5	5	DCV
VPWR	B35/36	VBAT	VBAT	VBAT	VBAT	DCV
FTPTVREF	B40	5	5	5	5	DCV
KAPWR	B45	VBAT	VBAT	VBAT	VBAT	DCV
BVREF	E57	5	5	5	5	DCV
TPVREF	E66	5	5	5	5	DCV

Typical Diagnostic Reference Values (Part 4)

NOTES:

The footnotes are referenced throughout the Typical Diagnostic Reference Value Charts. A letter in parentheses next to a value indicates supplemental information is applicable.

An attempt is made to provide as much information as possible; some vehicles may not display all input and output signals.

The Typical Diagnostic Reference Value Charts do not display fault parameter identifications (PIDs). These are PIDs which indicate a hard fault with

the circuit. They display a value of YES or NO and are PIDs ending with the letter F.

Reference values may vary +/-20% depending on operating conditions and other factors. RPM values are axle and tire dependent.

Refer to Introduction, Acronyms and Definitions for technical terms applicable to Ford Motor Company products.

Refer to Diagnostic Methods, Parameter Identification, for PID descriptions. See: Scan Tool Testing and Procedures/Parameter Identification (PID)

For detailed transmission diagnostics, refer to appropriate Vehicle System. Transmission signals may be referred to in either alpha or numeric form. For example, 1=A, 2=B, 3=C.

A. A/C on.
B. Cooling fan on (single, low or high speed).
C. Heated oxygen sensors (HO2S) should switch from rich to lean at least once every **3 seconds**. HO2S voltage should toggle above and below **0.450 DCV** and never be a negative value. Valid HO2S switching occurs only during closed loop fuel control.
D. Downstream HO2S(s) will stay close to a constant voltage when the catalyst monitor is off (positive value only). When the catalyst monitor is on, HO2S will switch rich to lean above and below **0.450 DCV** and never be a negative value. For downstream HO2S(s) (12, 13 22) greater activity will result when the catalyst monitor is active.
E. Brake pedal applied.
F. The electric vapor management valve (VMV) commanded current will vary from **0 mA - 1000 mA** depending on the PCM command to purge the EVAP system.
G. While pressing the transmission control switch (TCS) or switching to manual drive mode.
H. Value is dependent on fuel tank level. Typical operating range is 15% (empty) to 90% (full).
I. Steering wheel turned.
J. Clutch pedal applied.
K. Value is dependent upon ambient air temperature and may fall outside of range.
L. Value is not useful under this condition.
M. If equipped.
N. Transmission in selected range.
O. May change state under this condition.
P. While pressing switch.
Q. Frequency cycles high within a few seconds of turning headlamps on. Frequency cycles back to **0 Hz** shortly after cycling high.
R. Canister vent duty cycles to 100% (close) when EVAP monitor test is running.
S. Refer to Antitheft and Alarm Systems.
T. EGR voltage and duty cycle will vary from 0-VBAT or 0-100% depending on EGR demand.
U. RPM dependent. If signal is **0 Hz** at idle, check signal at **900 RPM**.
V. Crank position.