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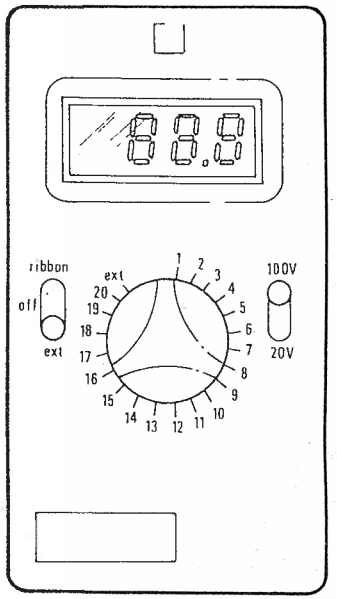
FICS 10 Relay Output A -.021281

Sw. No.	Function	Circuit Test Point	PCB Test Point	Meter/ Scope	Voltage
1	RELAY COIL 1	T1 COLLECTOR	1	M	On = 0.5v, Off = +24v
2	RELAY COIL 2	T2 COLLECTOR	2	M	" "
3	RELAY COIL 3	T3 COLLECTOR	3	M	" "
4	RELAY COIL 4	T4 COLLECTOR	4	M	" "
5	RELAY COIL 5	T5 COLLECTOR	5	M	" "
6	RELAY COIL 6	T6 COLLECTOR	6	M	" "
7	RELAY COIL 7	T7 COLLECTOR	7	M	" "
8	RELAY COIL 8	T8 COLLECTOR	8	M	" "
9	CLOCK - 'L' BUS	IC 1/3	9	S1	Groups of 8 pulses, + 5v, normally high, low low for 1us.
10	DATA- 'L' BUS	IC 1/5	10	S	+5v Data, normally low
11	STROBE - 'L' BUS	IC 8/3	11	S	+5v pulses, normally high
12	RESET- 'L' BUS	IC 8/4	12	S	+5v pulses, normally high low for approx. 80us
13	COINCIDENCE DATA	IC 8/5	13	S	+5v pulses, normally low
14	COINCIDENCE PULSE	IC 8/1	14	S	60 us, 20ms
15	WRITE PULSE	IC 8/2	15	S	5v Ov 60us on output transition only
16	+ 24v SUPPLY	C19 +ve	16	M	+24v
17	+ 5v SUPPLY	TERMINAL 37	17	M	+ 4.75v + 5.05v
18	Ov DIGITAL	TERMINAL 39	18	M	Ov
19	+5v DETECTION	T9 COLLECTOR	19	M	+23.5v (OV if +5v low)
20	STROBE OUTPUT LATCHES	IC 3/1	20	S	+5v Ov 60us on output transition only

EUROTHERM

DIAGNOSTIC UNIT TYPE 260

OPERATING INSTRUCTIONS



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EUROTHERM DIAGNOSTIC UNIT TYPE 260

This is a dedicated multi-meter, designed as a servicing aid for use with Eurotherm thyristor stacks 455 to 458, 461 to 464, and Furnace Integrated Control System FICS 10.

The unit is supplied in a carrying case, complete with Operating Booklet and mains charger. Low battery voltage in the unit is indicated by a warning — 'BAT' displayed on the meter. The unit may be used while the battery is being charged, as long as the warning is not being displayed. A brief specification is as follows:—

METER ASSEMBLY

DIMENSIONS: 144 × 80 × 43mm

WEIGHT: 245g

RANGES: ±20V dc, ±100V dc

FACILITIES: Auto-polarity, ribbon cable or flying lead connector. Oscilloscope connections.

POWER SUPPLY: Self-powered by re-chargeable Ni-Cd battery.

CHARGER ASSEMBLY

DIMENSIONS: 79 × 50 × 34mm

WEIGHT: 200g

INPUT: 230/240V ac or 110/115V ac 50/60Hz

OUTPUT: 9V dc @ 10/11mA

RE-CHARGE TIME: 14 hours (max).

CARRYING CASE

DIMENSIONS: 25 × 213 × 78mm

GROSS WEIGHT: 870g
(Meter + charger + case)

Eurotherm Limited
Faraday Close Durrington
Worthing West Sussex BN13 3PL
Telephone Worthing (0903) 68500
Telex 87114 EUROWG G

Two sockets at the top of the unit permit an oscilloscope to be connected to the point under test. Supplied with the unit is this instruction booklet of Diagnostic Test Tables—

Unit	Mode/Module	Table
Thyristor	Phase Angle Mode	1
Thyristor	All Cycles Modes	2
Thyristor	Fast/Single Cycle Modes	3
FICS 10	Power Supply	4
FICS 10	Main Controller	5
FICS 10	DC Solenoid Driver	6
FICS 10	Analogue Aquisition	7
FICS 10	Analogue Output	8
FICS 10	Relay Output	9

The Tables give details of the voltages and waveforms at each Diagnostic Point (designated DP on the relevant circuit).

Refer to the Service Manuals while using the Diagnostic Unit Type 260. These are:—

Thyristor Units 455 to 458	HA016906
461 to 464	HA016970
FICS 10	HA018934

The diagnostic facility on the thyristor units and FICS 10 modules is a 20 way fascia socket on the front panel, which is wired to 20 monitoring points in the circuit. Connection of the type 260 diagnostic unit allows monitoring, commissioning or testing for fault conditions. The digital panel meter allows accurate measurements to be made of all the important analogue signals within the unit, the signal being displayed on an oscilloscope by direct connection to the diagnostic unit. Positions 1 to 20 of the rotary switch allow measurements which can be compared with those illustrated on the diagnostic unit test tables.

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Thyristor Units 455,460 series – Phase Angle Mode 1-090682

Sw. No.	Function	0% Power	25% Power	50% Power	75% Power	100% Power
1	Current Feedback Voltage	Ov dc	+1.4v dc Av	+2.6v dc Av	+3.8v dc Av	+5v dc Av
2	Manual Input	NOT USED				
3	Partial Load Fail Alarm	+13v dc				
4	Setpoint (0-5v input mode)	Ov dc	+1.25v dc	+2.25v dc	+3.25v dc	+4.25v dc
5	Current Limit Input	+10v dc				
6	Buffered current For PLF	Ov dc	-1.3v dc Av	-2.5v dc Av	-3.7v dc Av	-4.6v dc Av
7	Voltage Feedback	Ov dc	+1.2v dc Av	+2.2v dc Av	+3.3v dc Av	+4.3v dc Av
8	Buffered Setpoint (any input mode)	Ov dc	-1.25v dc	-2.25v dc	-3.25v dc	-4.25v dc
9	Slave Firing	Ov dc	+4v dc Av	+5.8v dc Av	+8v dc Av	+12v dc Av
10	Phase Angle Signal	Ov dc 1v ptp	+7v dc Av	+8.2v dc Av	+9.8v dc Av	+12.5v dc Av
11	+10v Reference	+10v dc ± 20mv				
12	--24v Full Wave	--20v dc				
13	Pulse Oscillator Output	+26v dc no pulses output	+26v dc			
14	--15v Supply	--15v dc ± 150mv				
15	Oscillator Input	Ov dc	+2.8v dc Av	+3.2v dc Av	+3.4v dc Av	+3.4v dc Av
16	+15v Supply	+15v dc ± 150mv				
17	Zero crossover Pulse	+0.7v dc Av				
18	OV	Ov dc				
19	Phase Angle Ramp	+3.6v dc Av				
20	Mains Enable	--14v dc				
Conduction Angle		Θ = 0°	Θ ≤ 66°	Θ = 90°	Θ ≤ 114°	Θ = 180°

Diagnostic Test Table 1

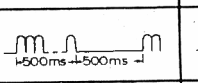
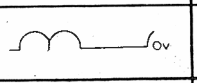
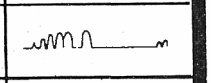
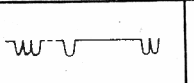
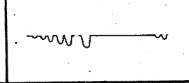
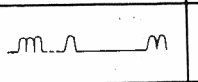
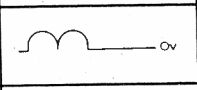
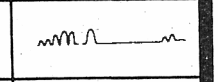
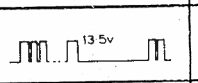
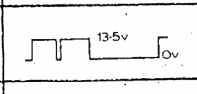
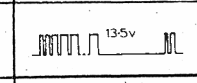
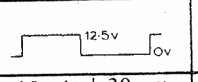
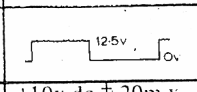
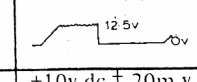
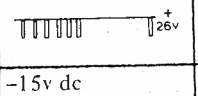
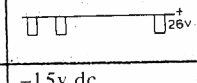
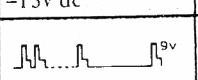
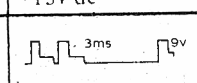
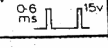
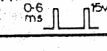
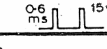
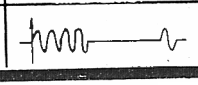
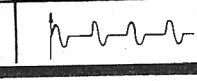
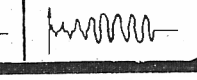
Thyristor Units 455,460 Series – All Cycle Modes 2-010682

Sw. No.	Function	Meter Scope	All Cycle Modes – Nominal Load, Normal Operation	
			0% Power	100% Power
1	Current Feedback Voltage	S	Ov dc	+5v dc Av
2	Manual Input	–	NOT USED	
3	Partial Load Fail Alarm	M	+13.5v dc	+13.5v dc
4	Setpoint (0-5v input mode)	M	Ov dc	+4.25v dc
5	Current Limit Input	M	+10v dc	+10v dc
6	Buffered Current For PLF	S	Ov dc	-4.6v dc Av
7	Voltage Feedback	S	Ov dc	+4.3v dc Av
8	Buffered Setpoint (any input mode)	M	Ov dc	-4.25v dc
9	Slave Firing	S	Ov dc	+12v dc Av
10	Phase Angle Signal	S	Ov dc 1v peak to peak	+12.5v dc Av
11	+10v Reference	M	+10v dc ± 20mv	+10v dc ± 20mv
12	--24v Full Wave	S	-20v dc Av	-20v dc Av
13	Pulse Oscillator Output	S	+26v dc no pulses	+26v dc
14	--15v Supply	M	-15v dc ± 150mv	-15v dc ± 150mv
15	Oscillator Input	S	Ov dc	+3.4dc Av
16	+15v Supply	M	+15v dc ± 150mv	+15v dc ± 150mv
17	Zero Crossover Pulse	S	+0.7v dc Av	+0.7v dc Av
18	Ov	M	Ov dc	Ov dc
19	Phase Angle Ramp	S	+3.6v dc Av	+3.6v dc Av
20	Mains Enable	M	--14.5v dc	--14.5v dc
Load Current				

Diagnostic Test Table 2

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Thyristor Units 455, 460 series – Fast/Single Cycle Modes 2-010682

Sw. No.	Function	Meter/ Scope	Fast Cycle 50% Power	Single Cycle 50% Power	Fast Cycle Phase angle start - up 50% Power
1	Current Feedback Voltage	S			
2	Manual Input	–	NOT	USED	
3	Partial Load Fail Alarm	M	+13.5v dc	+13.5v dc	+13.5v dc
4	Setpoint (0-5v input mode)	M	+2.25v dc	+2.25v dc	+2.25v dc
5	Current Limit Input	M	+10v dc	+10v dc	+10v dc
6	Buffered Current For PLF	S			
7	Voltage Feedback	S			
8	Buffered Setpoint (any input mode)	M	-2.25v dc	-2.25v dc	-2.25v dc
9	Slave Firing	S			
10	Phase Angle Signal	S			
11	+10v Reference	M	+10v dc ± 20m v	+10v dc ± 20m v	+10v dc ± 20m v
12	–24v Full Wave	S	-20v dc Av 	-20v dc Av 	-20v dc Av 
13	Pulse Oscillator Output	S			
14	–15v Supply	M	–15v dc	–15v dc	–15v dc
15	Oscillator Input	S			
16	+15v Supply	M	+15v dc	+15v dc	+15v dc
17	Zero Crossover Pulse	S	+0.7v dc Av 	+0.7v dc Av 	+0.7v dc Av 
18	Ov	M	Ov dc	Ov dc	Ov dc
19	Phase Angle Ramp	S	+3.6v dc Av 	+3.6v dc Av 	+3.6v dc Av 
20	Mains Enable	M	--14.5v dc	--14.5v dc	--14.5v dc
Load Current					

Diagnostic Test Table 3

FICS 10 Power Supply B - 290182

Sw. No.	Function	Circuit Position.	Meter/ Scope	Voltage	Tolerances Max.	Tolerances Min.
1	5v Regulator pre-fuse	JUNCTION C3 and D10	M	+35v	+40v	+22v
2	5v Regulator post-fuse	JUNCTION TH1 & 5A fuse	M	+35v	+40v	+22v
3	5v Power output	TERMINAL 21	M	+5v	+5.05v	+4.95v
4	Ov Ref.	TERMINAL 24	M	Ov	-	-
5	24v Pre - regulator	D9 CATHODE	M	+55v	+60v	+35v
6	5v Ref.	T6 EMITTER	M	+5v	+5.05v	+4.95v
7	Supply to I.C's	IC 3/12	M	+27v	+28v	+26.5v
8	+24v output	TERMINAL 16	M	+24v	+24.5v	+23.5v
9	Supply to ± 15v, +38v	T19 EMITTER	M	+20v	+22v	+19v
10	- 15v output	TERMINAL 19	M	- 15v	- 15.5v	- 14.5v
11	+ 15v output	TERMINAL 18	M	+ 15v	+15.5v	+14.5v
12	+38v output	TERMINAL 14	M	+38v *	+39v	+36v
13	Supply to I.C's	T14 EMITTER	M	+7.5v	+8v	+7v
14	Inverter Clock	IC 6/3	S	+7.5v pulses 10us interval	-	-
15	Mains failure output	TERMINAL 13	M	+5v	5.05v	2.75v
16	'Try Again' pulse	IC 6/10	S	+7.5v pulses high 1 sec. in 6 sec.	-	-
17	N/A	–	–	–	-	-
18	Ov Ref.	TERMINAL 20	M	Ov	-	-
19	N/A	–	–	–	-	-
20	N/A	–	–	–	-	-

* with Control Panel connected

Diagnostic Test Table 4

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FICS 10 Main Controller — D - 011281

Sw. No.	Function	Circuit Test Point	PCB Test Point	Meter Scope	Voltage
1	DIGITAL OUTPUT 1	TERMINAL 17	1	M	Off= approx. ext. supply ON= approx. 0.3v
2	DIGITAL OUTPUT 2	TERMINAL 18	2	M	"
3	DIGITAL OUTPUT 3	TERMINAL 19	3	M	"
4	DIGITAL OUTPUT 4	TERMINAL 20	4	M	"
5	DIGITAL OUTPUT 5	TERMINAL 21	5	M	"
6	DIGITAL OUTPUT 6	TERMINAL 22	6	M	"
7	DIGITAL OUTPUT 7	TERMINAL 23	7	M	"
8	DIGITAL OUTPUT 8	TERMINAL 24	8	M	"
9	STROBE OUTPUT LATCHES	IC 9/1	9	S	5us +5v ov — Normally low, high on transit ion of output.
10	CLOCK FOR 'S' and 'M' BUSES.	IC 39/6	10	S	3us 3us 3us + 5v ov
11	COMPUTER PORT TRANSMIT DATA	IC 42/6	11	S	5v Data, normally high
12	DATA FOR 'L' BUS	IC 37/19	12	S	5v Data, normally low
13	COMPUTER PORT RECEIVE DATA	IC 42/2	13	S	5v Data, normally high
14	CLOCK FOR 'L' BUS	IC 37/18	14	S	Groups of 8 pulses, 5v, normally high, low for 1 us.
15	XTAL OSCILLATOR	IC 35/38	15	S	0.25v 4MHz
16	LOGIC BUS RESET	RIBBON 17	16	S	5v, normally high, low for 80 us approx.
17	+ 5v SUPPLY	TERMINAL 37	17	M	+4.75v – 5.05v
18	Ov DIGITAL	TERMINAL 39	18	M	Ov
19	BATTERY VOLTAGE	JUNCTION OF D2 and R42	19	M	+ 2.7v to 3.7v Below 2.7v replace battery
20	CLOCK FOR 'L' BUS AFTER LINE RECEIVER	IC 5/5	20	S	Groups of 8 pulses, 5v, normally high, low for 1 us.

FICS 10 DC Solenoid Driver — 2 - 221181

Sw. No.	Function	Circuit Test Point	PCB Test Point	Meter/ Scope	Voltage
1	DIGITAL INPUT 1	IC 9/7	1	M	Ov or 4.3v
2	DIGITAL INPUT 2	IC 9/6	2	M	Ov or 4.3v
3	DIGITAL INPUT 3	IC 9/5	3	M	Ov or 4.3v
4	DIGITAL INPUT 4	IC 9/4	4	M	Ov or 4.3v
5	DIGITAL INPUT 5	IC 9/13	5	M	Ov or 4.3v
6	DIGITAL INPUT 6	IC 9/14	6	M	Ov or 4.3v
7	DIGITAL INPUT 7	IC 9/15	7	M	Ov or 4.3v
8	DIGITAL INPUT 8	IC 9/1	8	M	Ov or 4.3v
9	DRIVER OUTPUT 1	TERMINAL 17	9	M	Off = Ov On = approx.ext supply
10	DRIVER OUTPUT 2	TERMINAL 18	10	M	"
11	DRIVER OUTPUT 3	TERMINAL 19	11	M	"
12	DRIVER OUTPUT 4	TERMINAL 20	12	M	"
13	DRIVER OUTPUT 5	TERMINAL 21	13	M	"
14	DRIVER OUTPUT 6	TERMINAL 22	14	M	"
15	DRIVER OUTPUT 7	TERMINAL 23	15	M	"
16	DRIVER OUTPUT 8	TERMINAL 24	16	M	"
17	+ 5v SUPPLY	TERMINAL 37	17	M	+4.75 to 5.05v
18	Ov DIGITAL	TERMINAL 39	18	M	Ov
19	ENABLE PULSE STROBING LINE - DRIVER ONTO LOGIC BUS	IC 12/4	19	S	+5v, 60us, OV — PULSE EVERY 20ms
20	DATA THROUGH LINE DRIVER ONTO LOGIC BUS	IC 12/1	20	S	2-20us, 2us, +5v, OV, 8 7 6 5 4 3 2 1, 20ms — E.g. Pulse output at 1,3,4,6 & 8

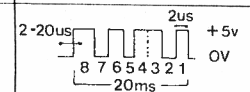
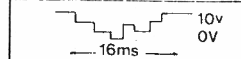
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FICS 10 Analogue Acquisition 1 - 070182

Switch Position	Function	Circuit Test Point	Meter Scope	Voltage
1	INPUT 1	TERMINAL 1	M	Analogue input voltage amplified to 0-10v if derived from an 'INPUT ISOLATOR MODULE'.
2	INPUT 2	TERMINAL 2	M	
3	INPUT 3	TERMINAL 3	M	
4	INPUT 4	TERMINAL 4	M	
5	INPUT 5	TERMINAL 5	M	
6	INPUT 6	TERMINAL 6	M	
7	INPUT 7	TERMINAL 7	M	
8	INPUT 8	TERMINAL 8	M	
9	INPUT 9	TERMINAL 9	M	
10	INPUT 10	TERMINAL 10	M	
11	INPUT 11	TERMINAL 11	M	
12	INPUT 12	TERMINAL 12	M	
13	INPUT 13	TERMINAL 13	M	
14	INPUT 14	TERMINAL 14	M	
15	INPUT 15	TERMINAL 15	M	
16	INPUT 16	TERMINAL 16	M	
17	+5v SUPPLY	TERMINAL 37	M	+ 4.75v to +5.05v
18	Ov DIGITAL	TERMINAL 39	M	Ov
19	+15v SUPPLY	RIBBON 18	M	+15v) ± 0.5v
20	--15v SUPPLY	RIBBON 19	M	-15v)

Note: Set Diagnostic Meter to 'Ribbon' 20v span.

FICS 10 Analogue Output 2 - 070181

Sw. No.	Function	Circuit Test Point	PCB Test Point	Meter Scope	Voltage
1	DIGITAL INPUT 1	IC 25/7	1	M	Ov to + 4.3v
2	DIGITAL INPUT 2	IC 25/6	2	M	Ov or + 4.3v
3	DIGITAL INPUT 3	IC 25/5	3	M	Ov or + 4.3v
4	DIGITAL INPUT 4	IC 25/4	4	M	Ov or + 4.3v
5	DIGITAL INPUT 5	IC 25/13	5	M	Ov or + 4.3v
6	DIGITAL INPUT 6	IC 25/14	6	M	Ov or + 4.3v
7	DIGITAL INPUT 7	IC 25/15	7	M	Ov or + 4.3v
8	DIGITAL INPUT 8	IC 25/1	8	M	Ov or + 4.3v
9	ANALOGUE OUTPUT 1	TERMINAL 17	9	M	Ov to +10v
10	ANALOGUE OUTPUT 2	TERMINAL 18	10	M	Ov to +10v
11	ANALOGUE OUTPUT 3	TERMINAL 19	11	M	Ov to +10v
12	ANALOGUE OUTPUT 4	TERMINAL 20	12	M	Ov to +10v
13	ANALOGUE OUTPUT 5	TERMINAL 21	13	M	Ov to +10v
14	ANALOGUE OUTPUT 6	TERMINAL 22	14	M	Ov to +10v
15	ANALOGUE OUTPUT 7	TERMINAL 23	15	M	Ov to +10v
16	ANALOGUE OUTPUT 8	TERMINAL 24	16	M	Ov to +10v
17	+ 5 VOLT SUPPLY	TERMINAL 37	17	M	+ 4.75v to + 5.05v
18	0 VOLT (ANALOGUE)	RIBBON 20	18	M	Ov
19	DATA TO LINE DRIVER (3487)	IC 27/1	19	S	 E.g. Pulse output at 1,3,4,6 & 8
20	MULTIPLEXED ANALOGUE OUTPUT LEVELS	IC 9/18	20	S	 E.g. 8 analogue outputs

Note: Set Diagnostic Meter to 'Ribbon' 20v span.

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