Telemetering System

TELEMETERING UNIT

MODEL **DLS**

MODEL & SUFFIX CODE SELECTION

DLS–❑❑–❑/❑

MODEL

TRANSMISSION MEDIA

1 : Twisted-pair cable
2 : Fiber optics cable
7 : Twisted-pair – fiber optics (repeater incorporated)

I/O SECTION

00 : None
A1 : Di 32 points
A2 : Di 64 points
C1 : Do 32 points (relay)
C2 : Do 32 points (open collector)
C3 : Do 64 points (relay)
C4 : Do 64 points (open collector)
E1 : Di 16 + Do 16 points (relay)
E2 : Di 16 + Do 16 points (open collector)
G1❑: Ai 32 points
M1❑: Ao 32 points
P1❑ : Pi 16 + Ai 16 points
R1❑❑: Ai 16 + Ao 16 points
S1❑❑: Ai 8 + Ao 8 + Di 8 + Do 8 points
U1❑ : Po 16 + Ao 16 points

POWER INPUT

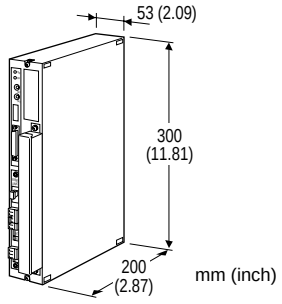
AC Power	DC Power
K : 85 – 132V AC	**R** : 24V DC
L : 170 – 264V AC	**S** : 12V DC

MODEM

A1A : M-System's 50 bps use modem (model: MOD); Station A
A1B : M-System's 50 bps use modem (model: MOD); Station B
M4A : M-System's 300 bps use voice/data modem (model: MOD4, MOD7); Station A
M4B : M-System's 300 bps use voice/data modem (model: MOD4, MOD7); Station B
M5A : M-System's 1200 bps use modem (model: MOD5); Station A
M5B : M-System's 1200 bps use modem (model: MOD5); Station B
M6A : M-System's 2400 bps use modem (model: MOD6); Station A
M6B : M-System's 2400 bps use modem (model: MOD6); Station B

Consult factory for modem specifications.

See data sheet for Standard Multi-Transmission Unit (model: DLA) for specifications of I/O sections.



Functions & Features

• Interfacing remote I/O devices with a modem for a telemetering system • Process I/O

ORDERING INFORMATION

Specify code number and variables. Use Ordering Information Sheet to specify I/O range and scaling factor, etc.

•**Code number** (e.g. DLS-1S1A4B4-K/M4A)

RELATED PRODUCTS

•**Standard multi-transmission unit** (model: DLA)
•**Remote I/O interface unit** (model: DLC)
•**Repeater** (model: DAL3)
•**Lightning surge protector for MsysNet** (model: MDP-DM3)
•**Programming unit** (model: PU-2❑)

GENERAL SPECIFICATIONS

Construction: surface mounting; terminal access on the front
Housing material: flame-resistant resin (beige)
Isolation: I/O to transmission section to power

■CONTROLLER & TRANSMISSION SECTIONS

Power indicator: red LED turns ON in normal conditions; OFF when the voltage level becomes low.
RUN indicator: red LED turns OFF in an abnormality.

•RUN Contact (LED) Behaviors

The LED operates when both the communication line conditions and DLS units conditions are true.

Comm. line conditions

Input units (A1, A2, G1 and P1): The LED turns ON with the network configured; OFF in an abnormality; the network is reconfigured after an abnormality.

Output units (C1, C2, C3, C4, M1 and U1): The LED turns ON when data from the paired input unit is received normally, with the network configured; OFF when the data is lost; turns also OFF in an abnormality in the network.

I/O-mixed units (E1, E2, R1 and S1): Functions of both input and output units are used.

[CAUTION]
When the network is reconfigured e.g. by noise interference, the RUN LED and output for all units on the network turn briefly OFF until they are turned ON after the reconfiguration is complete.

DLS units conditions: The LED turns ON when the transmission is normal between the DLS units; OFF after three retries in a transmission abnormality.

Error detection

Communication: the receiver units detect loss of communication and wire break.

CPU: watch-dog timer

Power voltage: detects when the voltage supply to the CPU drops by 10%.

Station No. adjustment: 2 rotary switches; 00 – FF (256)

Transmission line terminal: connector terminal

Power supply terminal: connector terminal

■I/O SECTION

Contact I/O indicator LED: red lights turn on when the respective I/O channels are ON.

Analog I/O CPU RUN indicator LED: red LED turns ON when the CPU function proves normal, OFF in an abnormality.

Modular jack for Programming Unit

Provided with: analog I/O and pulse input units

Programming: various parameters

I/O connection

32-point I/O (or less): 40-pin connector terminal; M3 × 6 screws (torque ≤0.7 N·m)

64-point I/O: FCN 40-pin connector (two); (FUJITSU FCN-364P040-AU)

MULTI-TRANSMISSION

Communication: half-duplex, synchronous

Transmission: conform to RS-422, EIA

Transmission speed: 125 kbps

Protocol: SIN-NET (M-System's; data format conforms to SDLC)

Error check: CRC

■TRANSMISSION MEDIA

•Twisted-pair Cable

Cable: CPEV-0.9 dia.

Connection: connector terminal

Transmission distance: 1 kilometer max. with 16 units connected; 3 kilometers max. between 2 stations each of which consists of 3 units

Terminator: incorporated (Remove the attached jumper pin when the unit is not located at the end of transmission line.)

•Fiber Optics Cable

Link: JIS F07 connector*

Transmission distance: 5 meters max. with APF, 1 kilometer max. with PCF

Transmission loss: 7 dB max.

*Consult factory for details.

•Twisted-pair – Fiber Optics: converting signals between two media and waveform shaping

■RUN OUTPUT: contact opens in an abnormality. 100V AC or 30V DC @1A (resistive load)

Connection: connector terminal

MODEM INTERFACE

Communication: asynchronous, half-duplex, non-procedure

Transmission: conform to RS-232C, EIA

DIP switch: setting RS-232C specifications

Transmission speed: 50 – 9600 bps

Data bit: 7 or 8 bits

Stop bit: 1, 1.5 or 2 bits

Parity: even or odd

RS-232C connector: 25-pin D-sub connector

RS-232C cable: straight (provided by the user)

Configuration: each station is composed of a DLS and a modem unit. The paired DLS's are adjusted at the factory as Station A and Station B.

INSTALLATION

Power input

AC: operational within the power ratings, 47 – 66 Hz, approx. 17.5VA max.

DC: rating ±10% (ripple 10% p-p max.) approx. 17W max. (1.1A with 24V)

Grounding: not required in normal environments; 100Ω or less grounding resistance in noisy environments

Operating temperature: -5 to +50°C (23 to 122°F)

Operating humidity: 30 to 90% RH (non-condensing)

Atmosphere: no corrosive gas or dust particles

Mounting: surface; Rack Mounting Frame (model: BX-1DL) available

Weight: 2 kg (4.4 lbs)

PERFORMANCE

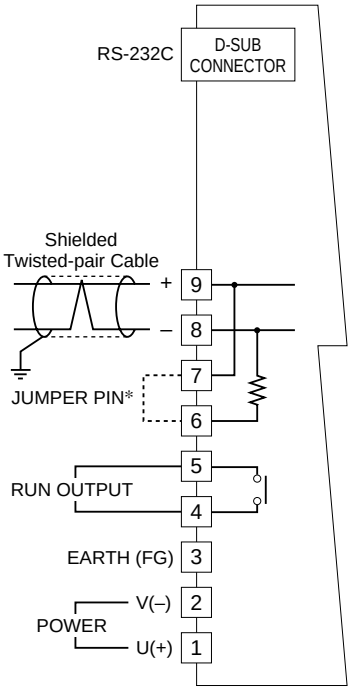
Permissible power failure duration: 20 ms max.

Insulation resistance: ≥100MΩ with 500V DC

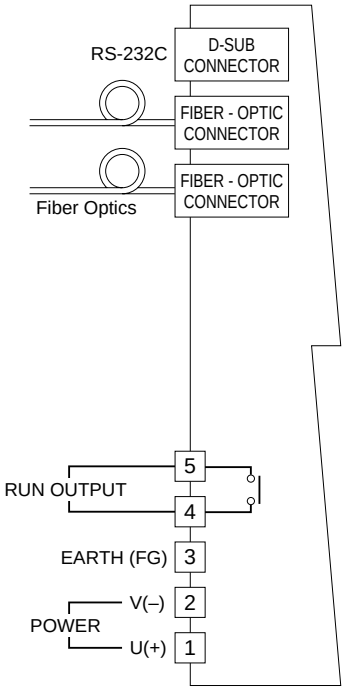
Dielectric strength: 1500V AC @1 minute (I/O to transmission to power to ground)

TRANSMISSION & POWER CONNECTION

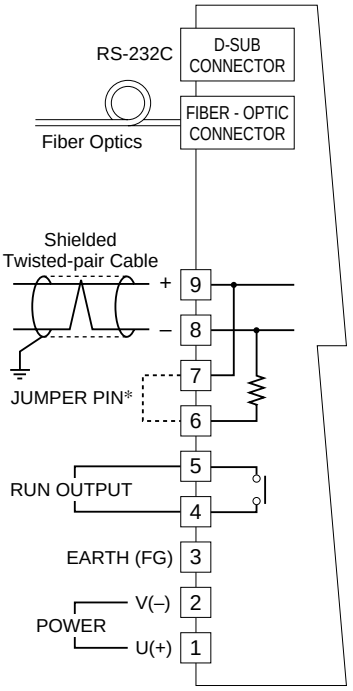
■TWISTED-PAIR CABLE (transmission media code: 1)



■FIBER OPTICS CABLE (transmission media code: 2)

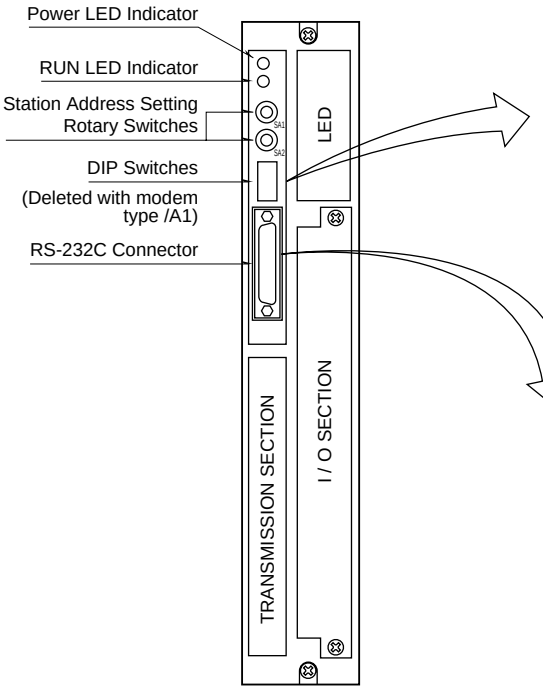


■TWISTED-PAIR & FIBER OPTICS (transmission media code: 7)

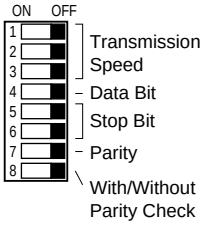


*When the unit is located at the end of transmission line via twisted-pair cable (= no cross-wiring), short across the terminals 6 – 7 with the jumper pin (or wire) provided with the unit. Remove the jumper pin for all the unit not located at the end.

FRONT PANEL CONFIGURATION



■DIP SWITCH



SWITCH NO.	TRANSMISSION SPEED (BPS)					
	300	600	1200	2400	4800	9600
1	OFF	OFF	OFF	OFF	ON	ON
2	OFF	OFF	ON	ON	OFF	OFF
3	OFF	OF	OFF	ON	OFF	ON

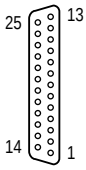
SWITCH NO.	7 BITS	8 BITS
4	OFF	ON

SWITCH NO.	1	1.5	2
5	OFF	ON	ON
6	ON	OFF	ON

SWITCH NO.	ODD	EVEN
7	OFF	ON

SWITCH NO.	WITH	W/O
8	OFF	ON

■D-SUB CONNECTOR PIN ASSIGNMENT

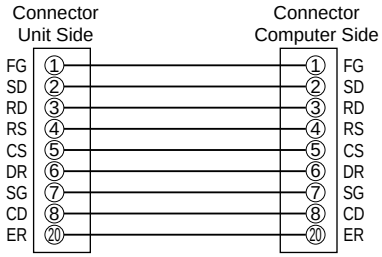


•MODEM SETTING

Set the DIP SW for the model suffix codes: /M4x, /M5x, /M6x. (x = A or B)

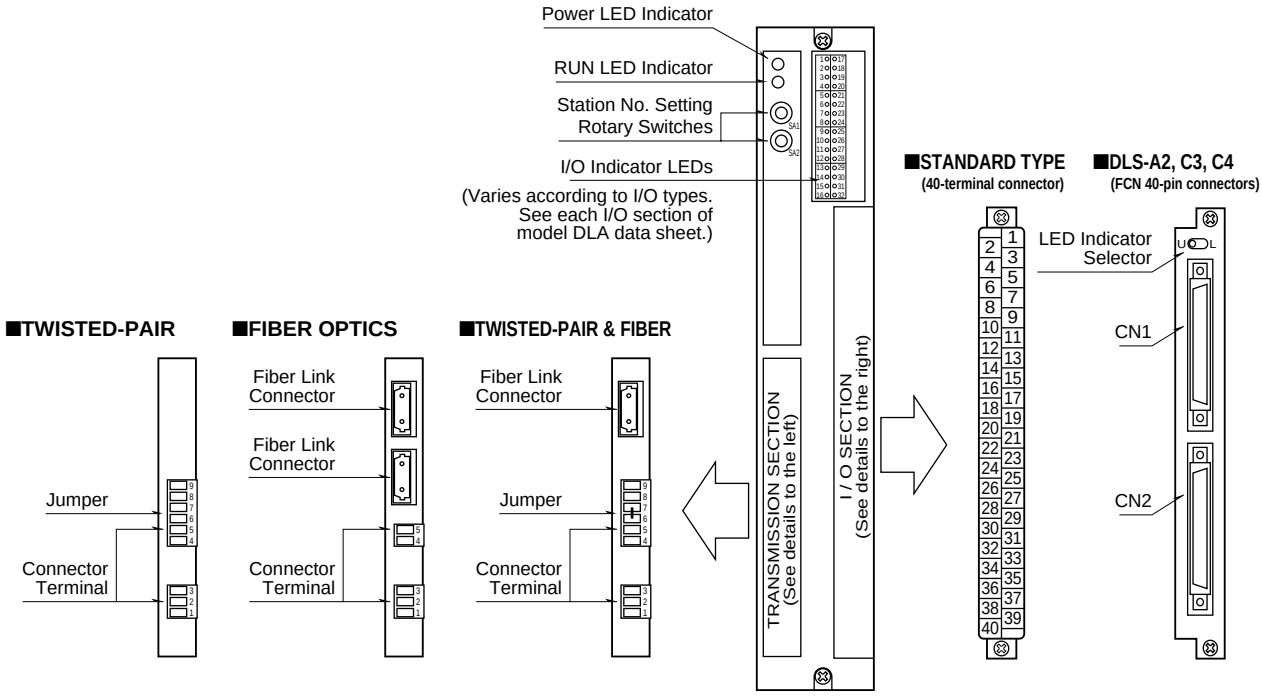
SWITCH NO.	MODEM TYPE		
	/M4x	/M5x	/M6x
1	OFF	OFF	OFF
2	OFF	ON	ON
3	OFF	OFF	ON
4	ON	ON	ON
5	ON	ON	OFF
6	ON	ON	ON
7	OFF	OFF	ON
8	ON	ON	OFF

•RS-232C Connection Example (straight type cable)



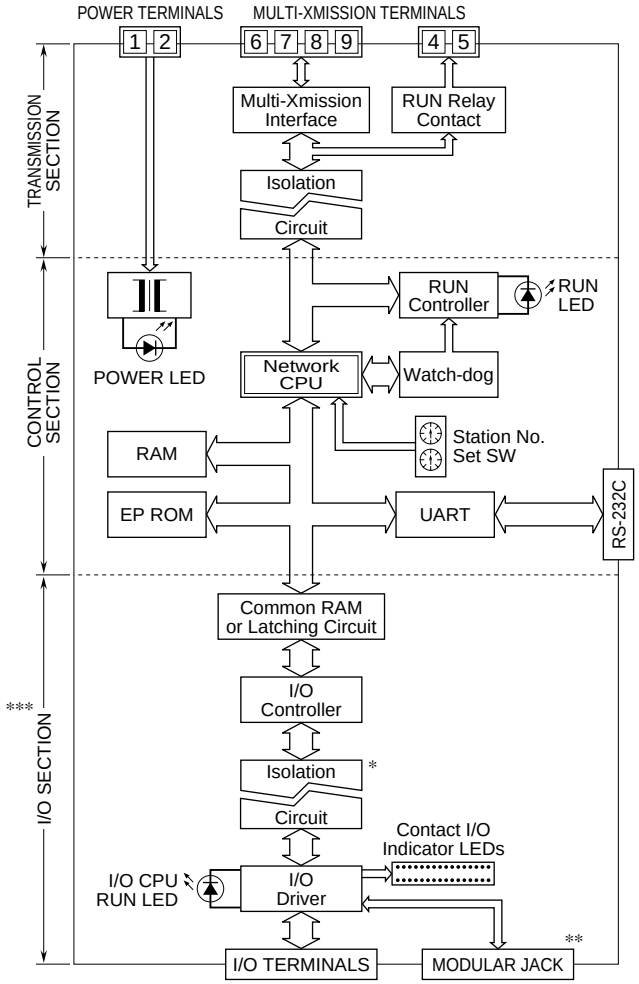
■MULTI-TRANSMISSION SECTION, PROCESS I/O SECTION & INDICATOR LED SECTION

(Process I/O and indicator LED sections are provided only for process I/O type)



Specifications subject to change without notice.

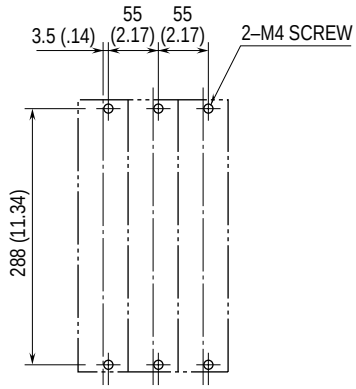
FUNCTION BLOCK DIAGRAM



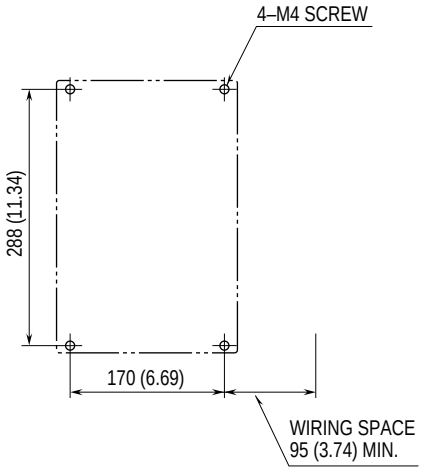
* Deleted with Codes G1, P1, R1 or S1.
** Deleted with Codes A1, A2, C1, C2, C3, C4, E1 or E2.
***Deleted when there is no process I/O.

MOUNTING REQUIREMENTS mm (inch)

■SURFACE MOUNTING

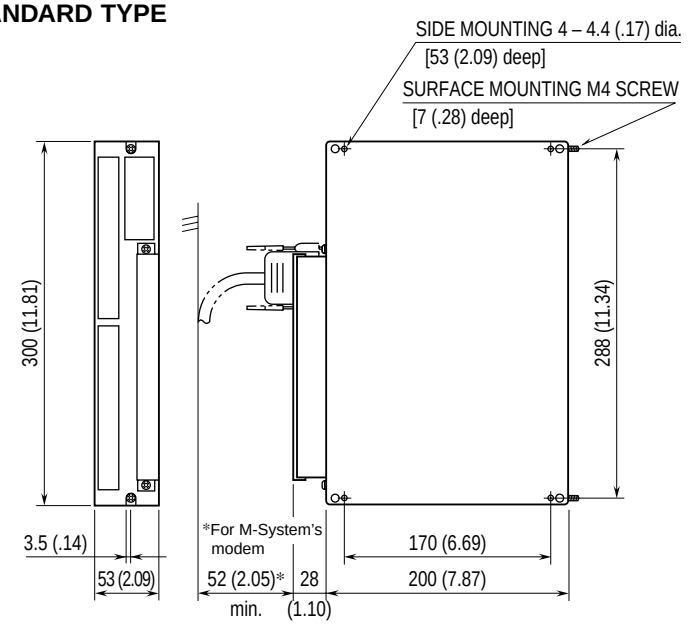


■SIDE MOUNTING (terminal block at the right side)



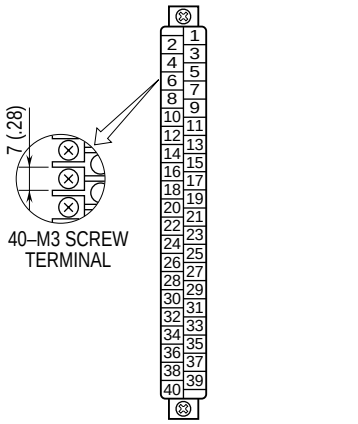
EXTERNAL DIMENSIONS mm (inch)

■STANDARD TYPE



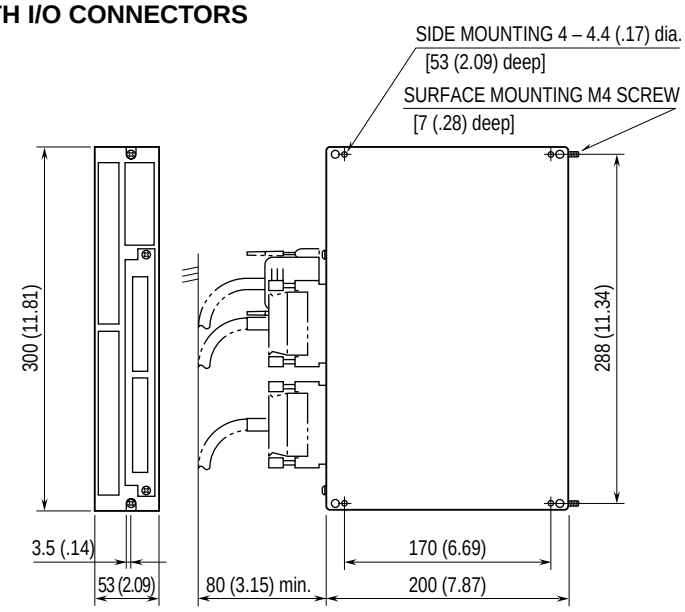
(Fig. A-1)

•40-pin Connector Terminal Block



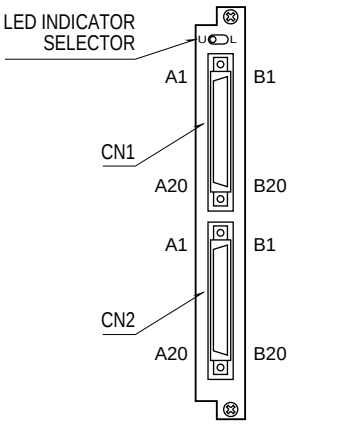
(Fig. A-2)

■WITH I/O CONNECTORS



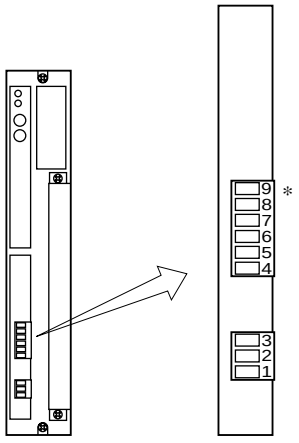
(Fig. B-1)

•Connector Pin Assignment

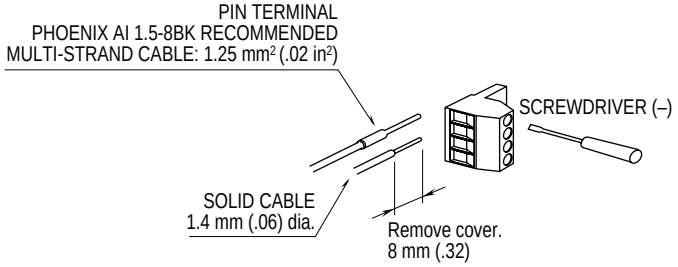


(Fig. B-2)

•Terminal Assignment, Connector Terminal Block



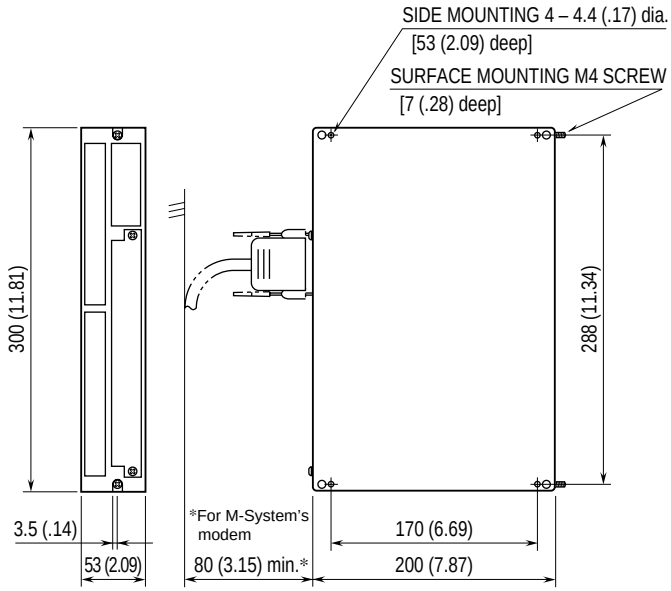
•Wiring Procedure of DIN Terminals



*Not provided for fiber optics (code 2)
Note : There is no specific order for connecting fiber optics.

Specifications subject to change without notice.

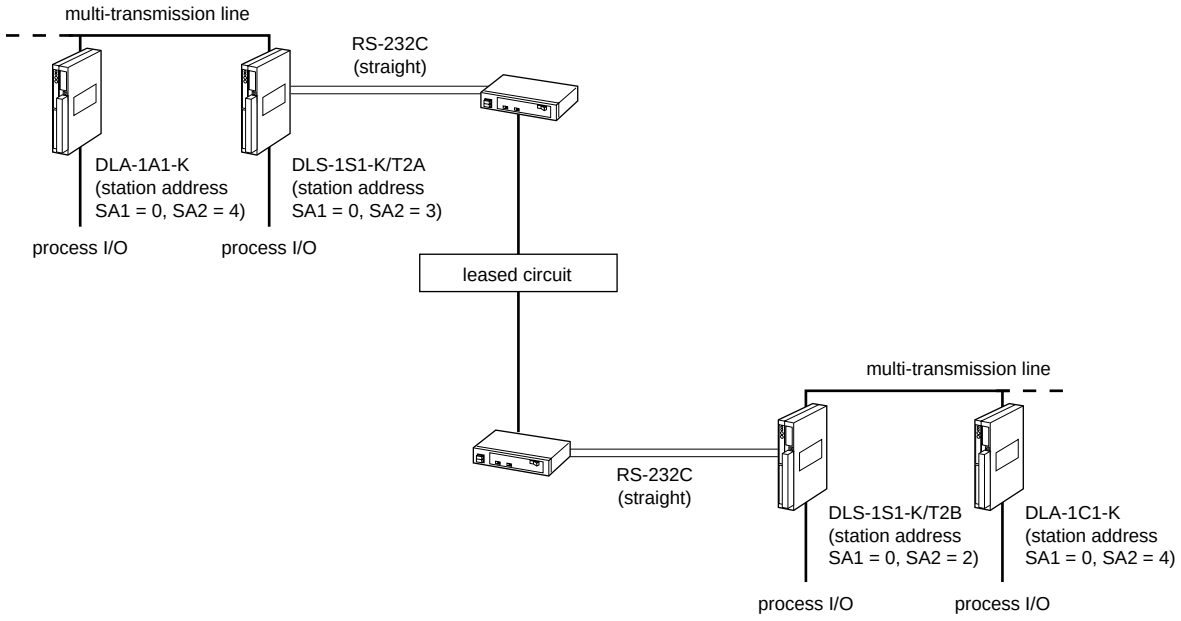
■WITHOUT PROCESS I/O



(Fig. C)

APPLICATIONS & EXPLANATIONS

■SYSTEM CONFIGURATION EXAMPLE



■HOW TO SET STATION ADDRESSES

The I/O units are connected in a series via a couple of modems.
Set the station address to DLA units as described in the DLA data sheet.
For the DLS with no process I/O, set a number remote from those for DLAs (such like FF, FE). When the DLS has process input or output, set it the same way as the DLA.

■HOW TO CONFIGURE MULTI-TRANSMISSION LINE

Refer to the data sheet for DLA unit.

■HOW TO CALCULATE TRANSMISSION SPEED

1. Data Volume and Transmission Time of I/O Unit

I/O type of DLS (or DLA) units determines each unit's multi-transmission time. The DLS collects data from each station and transmits to the other station.

INPUT MODEL SUFFIX	DATA VOLUME
A1, E1	30 bytes
A2	60 bytes
G1, P1	212 bytes
R1	116 bytes
S1	68 bytes
C1, C2, C3, C4, M1, U1	0 bytes

Transmission time for 1 unit is calculated utilizing each unit's data volume.

Transmission time = (data volume) × (number of data bits per 1 byte ÷ transmission speed [bps]) + waiting time per unit (0.5 sec.)

[example] Transmission time of type A1, S1 and C1 units

- A1 unit (1200 bps)
  30 × 12 ÷ 1200 + 0.5 = 0.8 (sec.)
- S1 unit (1200 bps)
  68 × 12 ÷ 1200 + 0.5 = 1.8 (sec.)
- C1 unit 0 sec.
  Transmission time for those units with 0 data volume equals 0.

2. Start / End of Transmission

The DLS transmits codes to the paired station at the start and end of transmission sequence respectively. The data volume differs according to modem type.

MODEM TYPE	MOD4/5	OTHERS
Start-of-transmission time	7 bytes	2 bytes
End-of transmission time	6 bytes	2 bytes

Start-of-Transmission time = (data volume) × (number of data bits per 1 byte ÷ transmission speed [bps]) + waiting time per unit (0.1 sec.)
Remark: Waiting time for MOD4 and MOD5 is 0.3 sec.

[example] Modem type /T2A (1200 bps)
2 × 12 ÷ 1200 + 0.1 = 0.12 (sec.)

End-of-Transmission time = (data volume) × (number of data bits per 1 byte ÷ transmission speed [bps]) + waiting time per unit (0.5 sec.)

[example] Modem type /T2A (1200 bps)
2 × 12 ÷ 1200 + 0.5 = 0.52 (sec.)

3. Total Transmission Time per Unit

The above (1) transmission time and (2) & (3) Start-/End-of transmission time must be added to calculate the total transmission time required by one DLS unit.

Total transmission time per unit = (start-of-transmission time) + (transmission time) + (end-of-transmission time)

[example] Station A: S1 and A1 units
Station B: S1 and C1 units
Modem type /T2A (1200 bps)

- Station A transmission time
  0.12 + (1.18 + 0.8) + 0.52 = 2.62 (sec.)
- Station B transmission time
  0.12 + (1.18 + 0) + 0.52 = 1.82 (sec.)

4. Overall Transmission Cycle

The overall transmission cycle is determined as the time required by one DLS unit starting transmission before the next transmission.

Overall transmission cycle = Station A total transmission time + Station B total transmission time

[example] Station A: S1 and A1 units
Station B: S1 and C1 units
Modem type /T2A (1200 bps)

2.62 + 1.82 = 4.44 (sec.)

The time required for the input signals to be output at the output unit varies according to the exact moment of input.

- Minimum (Station A input to Station B output)
  = Station A total transmission time per unit
  = 2.62 (sec.)
- Maximum (Station A input ot Station B output)
  = Overall transmission cycle
  + Station A total tansmission time per unit
  = 7.06 (sec.)

Therefore, the time required for a Station A input to be output at the Station B varies between 2.62 and 7.06 seconds as far as there is no transmission error.