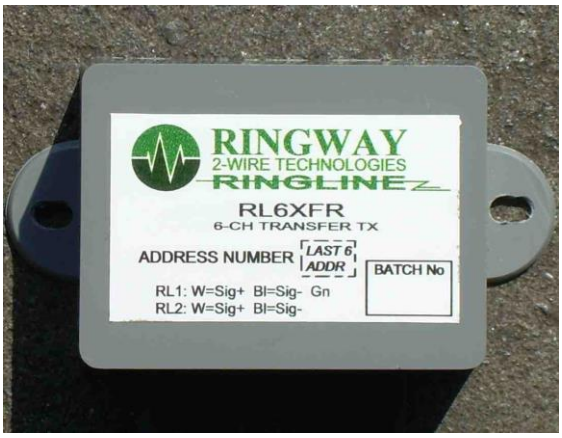
RINGLINE 2



TRANSFER TRANSCEIVER

(RL6XFR)

INSTALLATION MANUAL

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DEFINITIONS

The terms Ringline address and Ringline channel are used in this manual. They are not synonymous. A Ringline channel is a single bit on Ringline; e.g. channel 1A, channel 1B, whereas a Ringline address consists of two consecutive Ringline channels, e.g. 1AB which includes both channels 1A and 1B.

DESCRIPTION

The Ringline Six Channel Isolated Transfer Transceiver (RL6XFR) is a line-powered field device used to safely interlock two independent Ringline Emergency Stop systems. The RL6XFR uses the last three dual channel addresses from one system and encodes them onto the three preceding dual channel addresses of the other system and vice versa. System interlocking is achieved by transferring each safety output and its complimentary state ([1 0] for healthy and [0 1] unhealthy) from one system to the other over dual channel Ringline addresses.

Connection to the Ringline field buses is by two sets of flying lead. Each lead has a blue and a white wire which connect to the signal and common of the field bus.

INSTALLATION

The Transfer Transceiver is encapsulated in a foot mounted plastic housing with flying leads for circuit connection. Dimensions are shown in Figure 1.

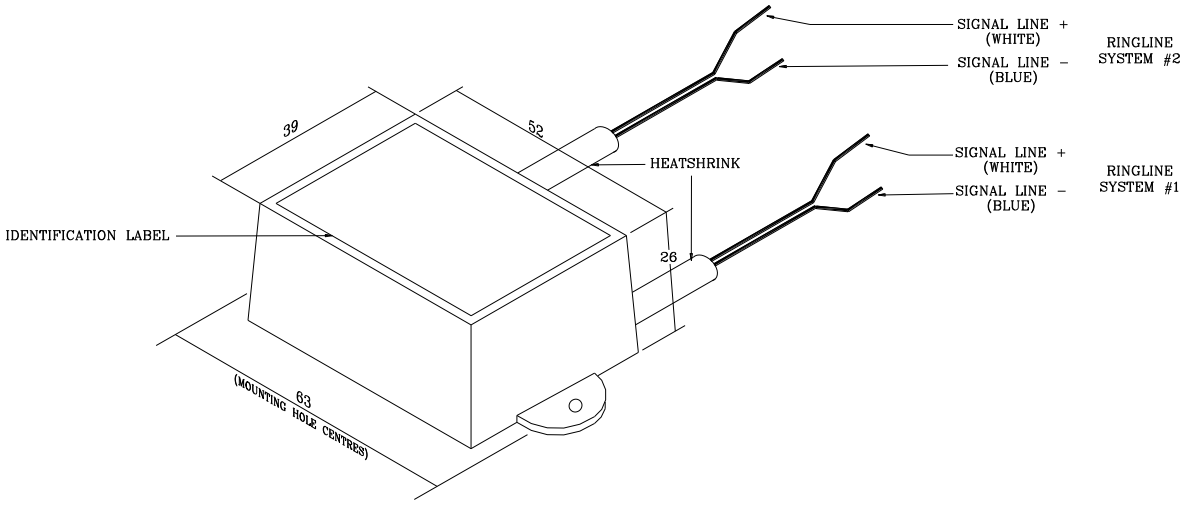

Figure 1 - Physical layout and dimensions

Field bus connections to the device are achieved using the flying leads connected to the device. Each flying lead should connect to one Ringline system only. A connection diagram is provided in Figure 2. Both flying leads have the standard Ringline high-reliability in-line plug and socket arrangement. While the device itself is hermetically sealed, it should be terminated in a suitable I.P. rated enclosure to protect the connection points from corrosion.

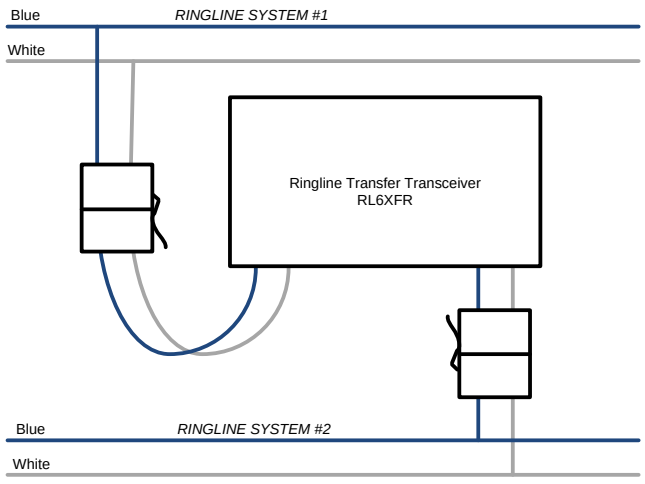

Figure 2 - Connections to Ringline field buses

OPERATION

The Ringline Transfer Transceiver duplicates the last three dual-channel addresses (6 channels in total) of Ringline system #1 in the 6th to 4th last dual-channel addresses of Ringline system #2 (Refer to Table 1 below for details). This operation is also performed in an identical fashion from System #2 back to System #1, through the Transfer Transceiver, so that the data map shown in Figure 3 results. Information that needs to be produced on the Remote Ringline system should use the last three dual-channel addresses of the Local Ringline system.

Local Ringline Address	Duplication address on Remote Ringline
Last	4th Last
2nd Last	5th Last
3rd Last	6th Last

Table 1 – Duplication of addresses by the RL6XFR

NOTE: The term 'Local Ringline' is used to differentiate between the local Ringline system and the system that is connected through the Transfer Transceiver. The connected system is referred to as 'Remote Ringline'.

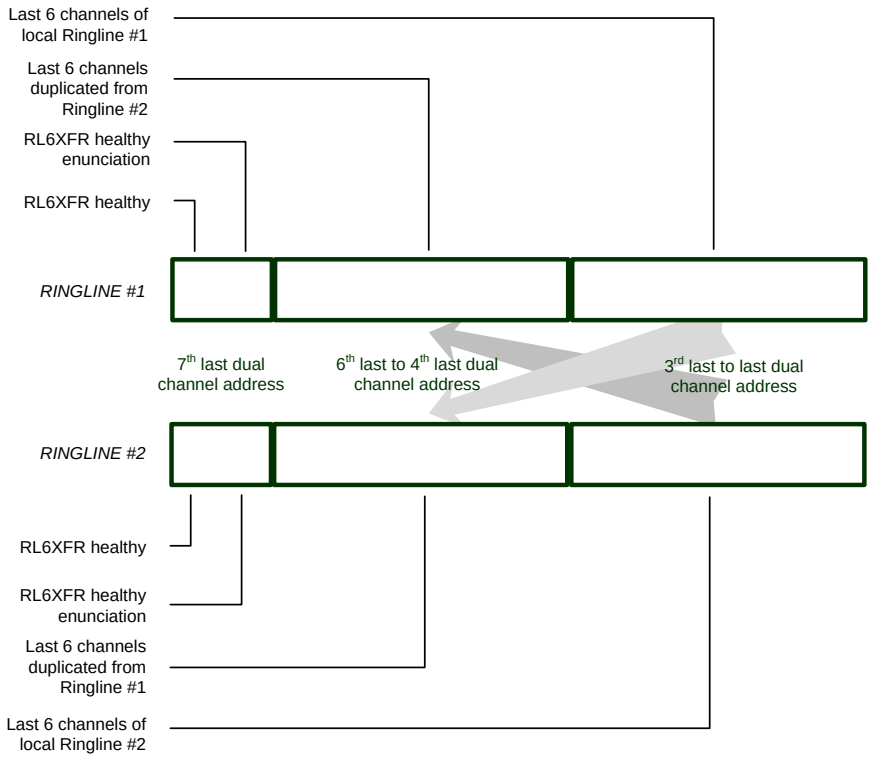

Figure 3 - Channel functions

The Transfer Transceiver automatically determines the length and baud rates of the connected systems on power up so that no configuration is required prior to use or with a system change.

The Transfer Transceiver continuously monitors the health of each Ringline input signal and its own internal functions. Any detected fault that would result in compromised data transfer will be

indicated by a loss of the [1,0] state on the 7th last address of the appropriate system as shown in Table 2.

7th last Address Status		
Addr. status	**Cause**	**Recommended action**
[1,0]	Local and remote Ringline healthy	Transferred data valid
[0,0]	Fault condition	Stop system
[0,1]	Fault condition with enunciation	Stop system, decode fault
[1,1]	Fault condition	Stop system

Table 2 - RL6XFR health indication bits

This creates the standard complementary [1,0] state on the 7th last address if health checks are passed on both sides of the transmitter, allowing this address to be incorporated directly into the block mask of the local safety card. A power failure on either Ringline system will result in the connected system reporting Remote Ringline unhealthy causing a system stoppage.

THE 7TH LAST ADDRESS OF BOTH ATTACHED SYSTEMS IS USED EXCLUSIVELY BY THE TRANSFER TRANSCEIVER. THIS ADDRESS SHOULD NOT BE ASSIGNED TO ANY OTHER TRANSMITTER.

TYPICAL APPLICATION

The transfer transceiver will typically be used where contiguous fail-safe control of a long conveyor e-stop system is required. It enables conveyors up to 24km in length (2 x 12km Ringline systems) to be safely controlled.

The interlocking of systems is achieved using the RL6XFR in conjunction with the Cat 4 Digital transmitter. The Cat 4 transmitter is connected to the outputs of the safety card via an auxiliary on the contactor (see Figure 4). If the Cat 4 is programmed to transmit on the last Ringline address the Transfer Transceiver will reproduce this status on the 4th last address on the remote Ringline

If we do the same on both sides of the transfer transceiver we have provided an easy way of sending the safety card status from one Ringline system to the other. If we set up the block mask on each safety card to include the 4th last address we have now interlocked the safety cards on either side of the transfer transmitter; if one system trips the other will immediately follow. We should note the redundancy that is achieved by this arrangement; in particular, the transfer of two redundant safety outputs and their compliment state, to ensure proper operation of the safety function with a single failure in either the Ringline control system, the field-bus or the transfer transceiver.

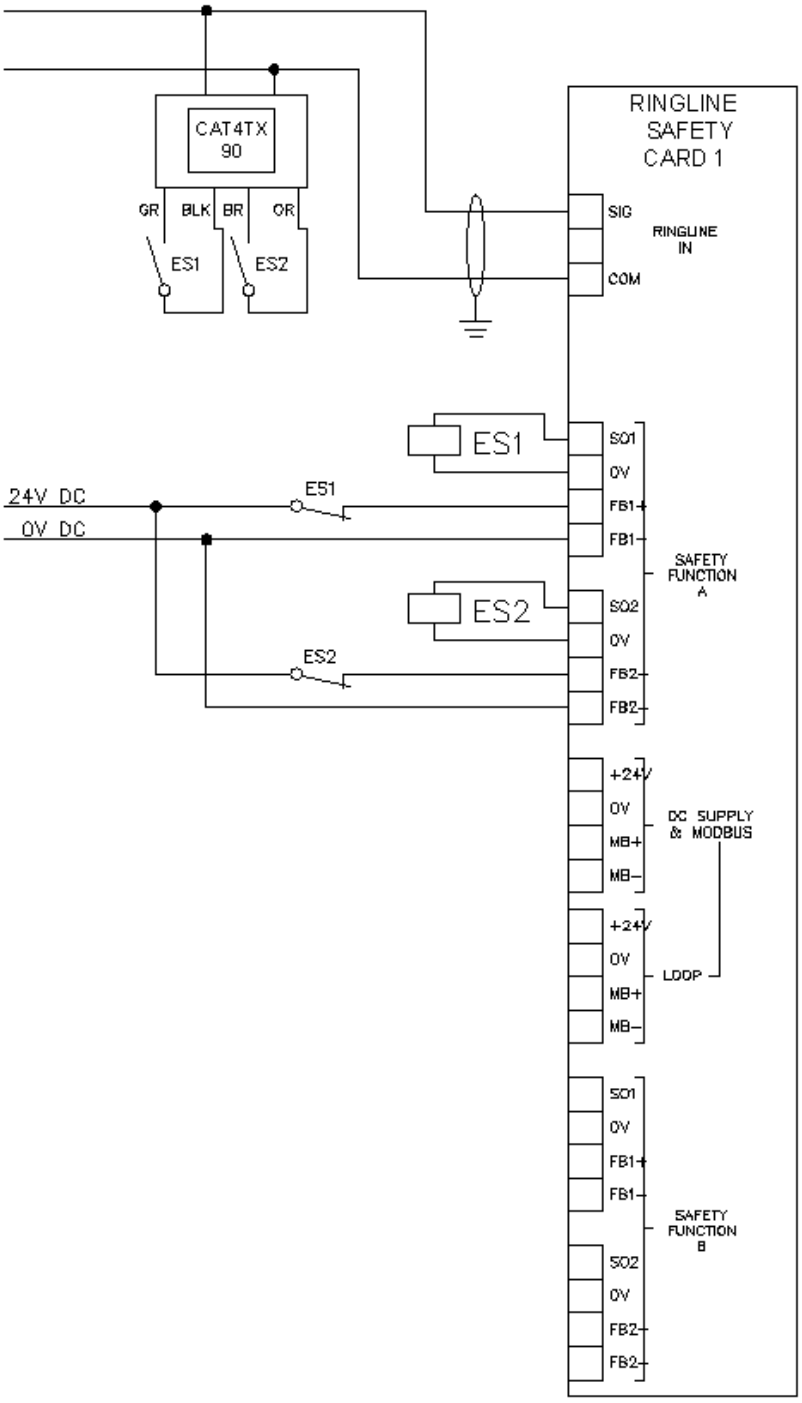

Figure 4 - Interlocking Ringline Systems through RL6XFR

Errors detected by the Transfer Transceiver will be enunciated over Ringline on the 7th last channel (e.g. for a 96 address system this will be channel 90B). The decoded error codes are shown in Table 3.

HEX	DEC	DESCRIPTION
FFE	4094	SIC flag register shows incomplete coverage
FFD	4093	The pulse width is outside the acceptable range
FFB	4091	A Ringline channel miscount has occurred
FF7	4087	Invalid or no packet received from other Ringline
FEF	4079	Ringline signal not present
FDF	4063	STATUS,C is faulted
FBF	4031	Last RAM check has failed
F7F	3967	Ringline not encoding correctly
EFF	3839	Unknown internal error
DFF	3583	- Reserved -
BFF	3071	- Reserved -
7FF	2047	Remote Ringline reports error

Table 3 - RL6XFR Fault Codes

Access to this data can be achieved over Modbus. Refer to the analogue data map in the Ringline MkII System manual for register locations. Faults shown in grey will be enunciated over Ringline, however due to the nature of the other faults the Ringline output from the device will instead be turned off. In this case the Ringline address will transmit [0 0]. Either case will result in an emergency stop.

SAFETY CONSIDERATIONS

The Failure Modes Effects Analysis (FMEA) on the RL6XFR highlighted some possible internal failures. These would prevent a stopping fault on one Ringline system being transferred through to the other system.

In this fault situation one Ringline system will automatically detect the faulty device and fail to safety; however the other drive must be stopped by other means. Thus it is essential to have a secondary communications link between the two drive systems.

When an emergency stop is detected on either Ringline system a control stop signal should be sent to the other drive panel via a secondary communications link. This will provide redundancy in the unlikely event that the Transfer Transceiver is unable to encode data onto the remote Ringline system.

TECHNICAL SPECIFICATIONS

Power Supply:	7.4V RMS from Ringline field bus
Inputs:	Decoded from Ringline bus
Outputs:	Encoded onto Ringline bus
Addressing:	Fixed – Last 7 addresses (variable with system address length)
Operating Temperature Range:	0°C to +70°C

THIS DEVICE IS NOT APPROVED FOR USE IN HAZARDOUS AREAS

THIS DEVICE IS NOT SUITABLE FOR TRANSFERRING ANALOGUE VALUES BETWEEN RINGLINE SYSTEMS.

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