

KEY PULSE INTERFACING

Introduction

Fish finders are an essential tool for anglers, as they can help to locate fish and identify their depth. However, fish finders can also interfere with each other, causing crosstalk. Crosstalk is the unwanted transfer of signal from one fish finder to another. This can make it difficult to see fish on the screen, as the signals from the other fish finders can be misinterpreted as fish targets or completely interfere with the proper signals. Crosstalk is considered "noise" or unwanted signal.

Keying Pulse (KP)

Keying pulse is a blanking pulse which is a technique that can be used to reduce crosstalk between fish finders. The keying pulse is a pre-transmission signal from the transmitting "master" sounder to tell the other connected fish finder to turn off its reception during the transmission period so not to receive the interfering signal. This handshaking or coordination between sounders will prevent crosstalk. Many times, crosstalk can be managed by simple "interference rejection" filters on the receiving sounder. KP is a method to eliminate the possibility of crosstalk.

Advantages of KP

- **Improved signal-to-noise ratio**: Key pulse can help to improve the signal-to-noise ratio of the returned echoes, making it easier to see fish by reducing noise.
- **Reduced clutter**: Key pulse can help to reduce clutter on the screen by eliminating cross talk between two connected sounders, making it easier to see fish.

Disadvantages of KP

- There will be slight negative impact on the sounders transmission rate, as it causes a slight delay due to the needed coordination time.
- Extra circuitry in the sounder is required to support this coordination along with additional wiring between both KP compatible fish finders.

STOP: Furuno advises attempting to mitigate interference using settings like "interference rejection" before resorting to the costs of incorporating KP interconnections. Unless the interference is of sufficient magnitude to outweigh the drawbacks of implementing KP, most users typically deem it unnecessary.

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Section 5: FCV1900 Key Pulse Supplement

Key Pulse CH500/600 to FCV1900

Section 1: KP Kit Wiring and Installation 1.1 DI-FFAMP/DFF3D KP CONNECTION



PN: 001-205-780-00 Includes:

- •1 ea KP Cable Machine Screws
- 1ea Gland Wire Crimp Butt connectors
- •EMI Filter
- •Cable Clamp

2. Example Connection

DI-FFAMP DFF3D Place supplied rrite Ring around I. Insert local supply cable thru provided cable gland and secure SHIELDED 4 CONDUCTOR CABLE NOT INCLUDED (LOCAL SUPPLY) EXT KP EXT KP TB1 J9 (TRIG OUT N) PIN 4 PIN 4 (TRIG OUT N) (TRIG OUT P) PIN 3 PIN 3 (TRIG OUT P) (TRIG IN N) PIN 2 PIN 2 (TRIG IN N) (TRIG IN P) PIN 1 PIN 1 (TRIG IN P)

1.2: DI-FFAMP/DFF3-UHD KP CONNECTION



PN: 001-205-780-00 Includes:

•1 ea KP Cable Machine Screws

•1ea Gland Wire Crimp Butt connectors

- •EMI Filter
- Cable Clamp

DFF3-UHD SHIELDED 4 CONDUCTOR CABLE NOT INCLUDED (LOCAL SUPPLY)

EXT KP TB1	EXT KP TB1
(TRIG OUT N) PIN 4	PIN 4 (TRIG OUT N)
(TRIG OUT P) PIN 3	PIN 3 (TRIG OUT P)
(TRIG IN N) PIN 2	PIN 2 (TRIG IN N)
(TRIG IN P) PIN 1	PIN 1 (TRIG IN P)

DI-FFAMP

1.3: DFF3D/TZT3 KP CONNECTION

001-605-510-00 Kit consists of the following:

- 1 ea. KP Cable
- 1 ea. Gland
- Screws
- Cable Clamp



Installing TZT3 DFF3D KP CONNECTION KIT

1. Remove the plastic cover and unfasten 4 phillips screws to remove metal shield cover.



2. Detach the protective sheet from the location for the external KP.

Protective sheet



- 3. Do the following:
 - 1) Unfasten the sealing nut and lock nut from the supplied cable gland. As shown below, pass the cable through the sealing nut, cable gland, hole in the network fish finder and the lock nut.

- 2) Tighten the Lock nut on the back of the cable gland.
- 3) Position the cable so the vinyl sheath lies in the cable clamp, then use the supplied cable clamp and set screw to secure the cable **ensuring that the ground wire contacts the chassis** then tighten down the screw. Then tighten the sealing nut of the cable gland.



4) Pass the cable through cable holder then connect the cable to J12 on the PWRTX board.



5) Attach the supplied EMI core to KP cable, approx. 10mm from the super gland.



6) Attach the shield cover and replace the plastic cover.

7) Connect DFF3D KP Cable to the TZT12F,16F, 19F pigtail cable labled "DI-FFAMP". Align the keyways, twist the locking collar of the DFF3D KP cable connector until it is locked

in place. If the connection is in a wet environment, seal up the conenction with electrical tape and then wrap it in vulcanizing tape.



1.4: DFF3-UHD/TZT3 KP CONNECTION

The 001-605-510-00 Kit consists of the following:

- 1ea. 000-163-191 (Screw/Washer HD M4X10)
- 1ea. 000-177-248-10 (XDCR Gland)
- 1ea. SG3-000-001-99 (5M Key Pulse Cable)
- 1ea. Metal Fixing Plate

(NOTE: Gland, screws and fixing plate not used in this application)



Installing TZT3 DFF3-UHD KP CONNECTION KIT

4. Remove the plastic cover and unfasten 4 phillips screws to remove metal shield cover.



5. Remove the KP cable gland sealing cover and blanking plug.



- 6. Do the following:
 - 7. Pass the cable through the sealing nut, cable gland, hole in the network fish finder and the lock nut.
 - 8. Tighten the Lock nut on the back of the cable gland.



9. Connect the Green Grounding Wire to the nearest screw on the metal cable clamp, ensuring that the ground wire contacts the chassis.



10. Remove the 4-pin XH connector housing, strip and connect the KP cable wires (Red and Black) to Connector TB1 using pins #1 and #2 as shown below.







11. Attach the shield cover and replace the plastic cover.



Connecting DFF3-UHD KP Cable Kit to TZT3 MFD (TZT12F,16F and 19F)

1. Connect DFF3-UHD KP Cable to the TZT12F,16F, 19F pigtail cable labled "DI-FFAMP". Align the keyways, twist the locking collar of the DFF3-UHD KP cable connector until it is locked in place. If the connection is in a wet environment, seal up the connection with electrical tape and then wrap it in vulcanizing tape.



Section 2: TZT3 MFD settings (TZT12F,16F,19F)

2.1: Settings for DI-FFAMP

The following settings must be made on TZtouch3 MFD physically connected to the DI-FFAMP.

1. Select [Settings]



2. Select [Fish Finder]



3. Set [Fish Finder Source] to <u>TZtouch3 MFD that is physically connected to DI-FFAMP.</u>



4. Set [External KP] to ON



*Note: Set External KP setting to ON only for the internal/DI fish finder under fish finder menu. **DO NOT** set External KP to ON within the Multi-Beam Sonar menu. Not following this will cause the multi-beam to stop transmitting.

2.2: Settings for the DFF3D and DFF3-UHD

1. Select **HOME** then **SETTINGS**



2. Select INITIAL SETUP, then Fish Finder



3. In Fish Finder, make sure that the correct sounder source is set to "DFF3-UHD"



4. Scroll down in the Fish Finder menu to EXTERNAL KP and set to ON



Section 3: Notes, Considerations and Examples

3.1: Notes and Considerations.

Slowdown of Sounder: You must keep in mind that utilizing the External KP function will slow down the Transmission Rate of the Internal Sounder as well as the DFF3D or DFF3-UHD. This will not impede function and is a normal condition. This occurs because the transmission pluses of both the TZtouch3 MFD/DI-FFAMP and the DFF3D/DFF3-UHD will be staggered so that they do not affect each other.

Primary and Secondary Modes: In most applications, the DFF3D or DFF3-UHD will function as the primary sounder. In some applications however, the internal sounder may be used as well. In this scenario, when you turn on the KP Sync button, that unit is now listening for the KP Sync signal (Secondary mode) to function. This means the DFF3-UHD is now **Listening** only for the KP Signal, not **Sending** one. Please ensure **ONLY ONE** of the Fish Finders has this selection turned ON, if both Fish Finders have KP Sync turned ON, neither Fish Finder will be transmitting as both would be listening for a signal.

Heaving and Pitch/Roll Compensation Considerations: With both the TZtouch3 MFD/DI-FFAMP and the DFF3D/DFF3-UHD we can employ Heaving Correction ("Heave" or "HVE") to correct for excessive Heaving in rougher seas. This is done using the input from a Satellite compass (Recommended installation) or, in the case of the DFF3D only, the built in motion sensor in its transducer (for pitch/roll). In a larger system utilizing both the TZtouch3 MFD or DI-FFAMP and the DFF3D or DFF3-UHD, the KP settings must be done correctly to make sure correct HVE correction across all sounders. If one inputs the "HVE" sentence from the Satellite Compass to the DFF3D, it will compensate regardless of KP Setting. To make this work correctly, you must set it as follows:

DFF3D/DFF3-UHD: KP - "ON"

DI-FFAMP: KP - "OFF"

This puts the DFF3D or DFF3-UHD is Secondary mode and the DI-FFAMP in Primary Mode.

Further Information on Heaving Correction.

		Fish Finder	Multi Beam Sonar
No	Model	FCV-1900 FCV-1150 DFF1-UHD, DFF3, DFF1, BBDS1, DFF3-UHD (Disp: NavNet) TZT9F/12F/16F/19F built-in Fish Finder DI-FFAMP (connected to TZT12F/16F/19F)	DFF-3D
1	How heave correction works	The Fish Finder collects and utilizes Heave Data from the satellite compass for each depth point. (See Section 3 - Case 2) Ituses this information and the current depth and compensate for Vessel heave and adjusts the image accordingly.	The DFF-3D receives the heave volume from SC/SCX at each TX (=KP) and adjust the image accordingly. (See Section 3 - Case 2)
2	KP not used KP Master Mode	Heave correction properly works.	Heave correction works.
3	KP Slave Mode	Heave correction does not work.	Heave correction works.
4	Why or why not???	When the Fish Finder works as the KP Slave in the external KP mode, the TX timing is synchronized with the master unit (I.E.It transmits in the timing defined by the master, not itself so that the heave correction will not work.	As the DFF-3D refers to only the overall heave volume at TX (rougher heave information compared to Fish Finder), the heave correction works even with the KP Slave.

3.2: Examples of interference and mitigation

Example without Interference Rejection (IR) or KP

- DFF3D and DI-FFAMP using 165T-PM542LM w/ KP OFF
 - DFF3D:
 - Auto Gain, Range 200ft, IR: Off
 - DI-FFAMP:
 - Manual Gain, Range 200ft, IR: Off
 - LF: Auto Chirp
 - MF: Auto Chirp



Interference can be seen here highlighted in Red.

Example use of KP:

- DFF3D and DI-FFAMP using 165T-PM542LM with KP ON in the DI-FFAMP
 - DFF3D:
 - Auto Gain, Range 200ft, IR: Off
 - DI-FFAMP:
 - Auto Gain (F), Range 200ft, IR: Off
 - LF: Auto Chirp
 - MF: Auto Chirp



Significant reduction in interference on the DI-FFAMP when KP Sync is on. This resulted in a clearer picture to the right of the Green line, denoting when KP was turned on in the DI-FFAMP

Example use of KP:

- DFF3D and DI-FFAMP using 165T-PM542LM W/KP ON in DFF3D
 - DFF3D:
 - Auto Gain, Range 200ft, IR: Off
 - DI-FFAMP:
 - Auto Gain (F), Range 200ft, IR: Off
 - LF: Auto Chirp
 - MF: Auto Chirp



Significant reduction in interference on the DI-FFAMP when KP Sync is on. This resulted in a cleaner picture to the right of the Green line, denoting when KP was turned on in the DFF3D. Blue Line indicates a change in the TX mode: CW (non-Chirp) back to Auto Chirp

Section 4: Interconnect Drawings 4.1: DFF3D to DI-FFAMP



4.2: DFF3-UHD to DI-FFAMP







Section 5: FCV1900/B/G KP Connection

Locate the FCV1900's Processor and carefully remove the three screws that are securing the Connector Cover:



When the FCV1900's Connector Cover is removed, you should see this:



Location of the connectors in the processor unit



With the Connector Cover is removed, locate the CN-6 Connector **here**:

On the CN-6 Connector you will need to use Pins 8 and 9 for the KEY PULSING OUT,



or use





Once the connections are made, then power on the FCV1900:

← x1	0/99	VRM	0.0
LF:2.0 0	HF:2.0 0.0		0
			_
 50			50 —
			- 30
_			_
_			_
_			_
100—			100 —
_			
_			_
_			
_			_
150—			150 —
_			_
_			
—			
—			—
200 —			200 —
-			—
-			
			—
[F1] Interference [F2] TVG 250 —			250 —

Push the MENU/ESC and use the Roto Key to scroll down to the System Settings:

← x1		1/99	VRM	0.0
Setting)	0	HF:2.0	0.0	-0
Sounder • User •	—			—
Display Range	—			
Measurement Auto Off	_			_
Alarm TX/RX				_
Data 🔸 Key 🔸				-
System Language English	50—			50 —
Units •	—			—
NMEA Port Set&Monitor	_			—
Calib >	_			
Stabilization				
Data Output Setting				
Save Setting	100—			100—
Benlay Image	-			—
Becord Video Data	_			—
Replay Video Data	_			_
	_			_
	150			150
	150-			150-
	-			—
	—			
	_			_
	_			_
	200			200
	200—			200—
	—			—
	—			—
	_			_
ft	—			
[F1] Interference [F2] TVG	250 —			250 —

Hold down the MENU/ESC Button for 10 Seconds to access the Service Menu:



In the Service Menu, for KEY PULSING IN select "In Trigger"

← x1			3/99	VRM	0.0
Setting)		0	HF:2.0	0.0	0
Sounder	 Bottom Search 	Auto			
Display	 Difference Gain 	· · _			
Measurement	 Difference Bottom Level 	• _			_
Alarm	▶ Log	•			
Data	Display Resolution SXGA(128	B0 x 1024)			_
System	 TX Triggering 	50 —			50 —
Service	 In Trigger 	Off <mark>Off</mark>			
	Trigger Input	↑ On			
	Out Trigger	Off			
	Trigger Output	Positive			_
	External Fish Finder Trigger	Off —			
	Restore Default Setting	10 <mark>0 —</mark>			100 —
	Demonstrate	Off _			
	XDCR Setting				
	TD-ID Information				_
	White Marker	· · -			
-	ACCU-FISH Calib	- 1			
	Fish Detection Mark	Off			150 —
	TrueEchoCHIRP				
	Bottom Noise Rejector	On			
	Fish Graph Reliability Thresho	ld 100 –			
		-			
		_			
		200 —			200 —
		200			200
		-			—
		-			
		_			
	ft	-			
[F1] Interference	[F2] TVG	250 —			250 —

Then select for "ON"

← x1			4/99		VRM 0.0
Setting)		0	HF:2.0	0.0	0
Sounder •	Bottom Search	Auto			—
Display •	Difference Gain	· -			—
Measurement	Difference Bottom Level	· _			_
Alarm •	Log	•			
Data 🔸	Display Resolution SXGA(12	80 x 1024)			
System •	TX Triggering) ——			50—
Service 🔸	In Trigger	On _			—
	Trigger Input	↑			
	Out Trigger	Off			
	Trigger Output	Positive			
	External Fish Finder Trigger	Off -			_
	Restore Default Setting) — (100—
	Demonstrate	Off			
	XDCR Setting				
	ID-ID Information				
	White Marker				_
	ACCU-FISH Callb		-		—
	Fish Detection Mark	UTT)			150 —
	Rettern Noise Rejector	0			
	Fish Graph Polishility Throsho	Jd 100			
	Fish Graph Reliability Thresho				—
		—			—
		—			—
		200 —			200 —
		_			
	ft	_			
[F1] Interference [F2]TVG	250 —			250 —

				out mggt	
← x1			5/99	VRM	0.0
Setting)		0	HF:2.0	0.0	
Sounder	 Bottom Search 	Auto		0.0	
Display	 Difference Gain 	• _			
Measurement	 Difference Bottom Level 	•			
Alarm	► Log	•			
Data	 Display Resolution SXGA(12 	80 x 1024)			_
System	 TX Triggering 	P			50 —
Service	In Trigger	Off			
	Trigger Input				
	Out Trigger	Off			_
	Trigger Output	Positive			
	External Fish Finder Trigger	Off -			—
	Restore Default Setting				100 —
	Demonstrate	Off _			
	XDCR Setting	_			
	ID-ID Information				
					_
	Fish Detection Mark	Off			
	TrueEchoCHIBP	— (150 —
	Bottom Noise Bejector	On -			
	Fish Graph Beliability Thresho	old 100 -			_
		100			
		—			_
		200 —			200 —
		_			_
	= ft				
[F1] Interference	[F2] TVG	250 —			250 —

For <u>KEY PULSING OUT</u> select "Out Trigger"

Then select either "HF" or "LF"

← x1			6/99	VRM	0.0
Setting)		0	HF:2.0	0.0	
Sounder	 Bottom Search 	Auto 🗖			—
Display	 Difference Gain 	· · -			—
Measurement	 Difference Bottom Level 	· · · _			_
Alarm	▶ Log	· ·			_
Data	 Display Resolution SXGA(128 	30 x 1024)			
System	 TX Triggering 	50 —			50—
Service	In Trigger	Off _			—
	Trigger Input	<u> </u>			_
	Out Trigger	Off Off			_
	Trigger Output	Positive HF			_
	External Fish Finder Trigger	Off LF			
	Restore Default Setting	100 —			100 —
	XDCR Sotting	- 10			—
	TD-ID Information	_			_
	White Marker	• -			_
	ACCU-FISH Calib	•			_
-	Fish Detection Mark	Off			
	TrueEchoCHIRP	150 —			150 —
	Bottom Noise Rejector	On 📃			-
	Fish Graph Reliability Thresho	ld 100 —			—
		_			_
		_			
		200 —			200 —
		—			—
		_			
		_			
	ft	_			_
[F1] Interference	[F2] TVG	250 —			250 —

← x1			7/99	VRM	0.0
Setting)		0	HF:2.0	0.0	0
Sounder	 Bottom Search 	Auto			—
Display	 Difference Gain 	· -			—
Measurement	 Difference Bottom Level 	· _			—
Alarm	► Log	· ·			_
Data	 Display Resolution SXGA(12) 	80 x 1024)			50
System	 TX Triggering 	50 —			50 —
Service	In Trigger	Off _			—
	Trigger Input	<u> </u>			—
	Out Trigger	Off Off			_
	Irigger Output	Positive HF			
	External Fish Finder Trigger	Off LF			_
	Restore Default Setting	100-			100 —
	VDCB Setting	- 10			—
	TD-ID Information	_			_
	White Marker	· _			_
	ACCU-FISH Calib				
	Fish Detection Mark	Off			_
	TrueEchoCHIRP	160 —			150 —
	Bottom Noise Rejector	On -			—
	Fish Graph Reliability Thresho	old 100 —			_
		_			_
		—			—
		200 —			200 —
		_			_
		_			_
	= _{ft}				_
					_
[F1] Interference	[F2] TVG	250 —			250 —

← x1			8/99	VR	V 0.0
Setting)		0	HF:2.0	0.0	0
Sounder	 Bottom Search 	Auto			—
Display	 Difference Gain 	· _			—
Measurement	 Difference Bottom Level 	· _			_
Alarm	▶ Log	•			
Data	Display Resolution SXGA(128	30 x 1024)			—
System	 TX Triggering) —— (50 —
Service	In Trigger	Off			<u> </u>
	Trigger Input	<u> </u>			_
	Out Trigger	LF			
	Trigger Output	Positive			—
	External Fish Finder Trigger	Off —			—
	Restore Default Setting	►) <u> </u>			100 —
	Demonstrate	Off			
	XDCR Setting				
	TD-ID Information				_
	White Marker	· -			—
	ACCU-FISH Calib	· —			—
	Fish Detection Mark	Off			150 —
	TrueEchoCHIRP	*			100
	Bottom Noise Rejector	On			
	Fish Graph Reliability Thresho	ld 100 —			—
		—			—
		_			_
		200 —			200 —
		200-			200-
		—			—
		—			—
		_			_
	ft	_			
[F1] Interference	[F2] TVG	250 —			250 —

Once all the selections have been made, then close the Service Menu by pressing the MENU/ESC Button



Power OFF the FCV1900 and then Re-Power the FCV1900 back ON to ensure all the unit's SETTINGS are working.



How to Key Pulse a CH500 or CH600 to a FCV1900/B/G:

You will need to purchase either the 001-471-570-00 (5 Meter KP Cable/Assy), or 001-471-580-00 (10 Meter KP Cable/Assy).



Connect the CH500/CH600 KP cable using the connector end to J-124 found on the CH503 Processor, and then connect the open wire(s) to the CN-6 Connector on the FCV1903 Processor as discussed earlier in this document:



Once the connections have been made, go into the MENU Settings of the CH500/CH600 and setup the Key Pulsing to the FCV1900/B/G:

Setting for Synchronizing Transmission with other Equipment (External KP)

To synchronize transmission with other echo sounder, do as follows:

- 1. Press the MENU key to open the menu.
- 2. [COM1] is selected on the menu bar; press ▼ to move the cursor inside the menu.



- 3. Press ▼ several times to select [TX Rate].
- Press ► to open the setting window.
- 5. Press ◀ several times to select [EXT.].
- 6. Press the **MENU** key to apply the settings and close the menu.

TX Rate	10
EXT. min	max
(EXT, 1	~10)

Note: If there is interference while the FCV1900/B/G is being used in CHIRP Mode, KP might not remove all the interference completely by synchronizing of both the fish finders/sonars. You may have to change the selected transmission frequency of the fish finder/sonar.