APPLICATION NOTE

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Product Family:	**GS20 VFD**	**Number:**	**AN-GS-020**
Subject:	**Master / Follower Conveyors**	**Date Issued:**	**July-8-2021**
		Revision:	**3 (for final review)**

A client intends to control the speed of 2 belt conveyors in the range of 10 to 100% of the speed using a potentiometer and pushbuttons installed in a console in the control station. This is considered the remote control.

Additionally, for maintenance purposes, he wants to use the VFD keypad. It will also exist a 2-position selector switch in this console for selection of local operation for maintenance.

These conveyors are driven by induction motors of 5 HP, 1150 rpm type MTCP2-005-3BD12 using a GS23-45P0 VFD and other of 15 HP, 1750 rpm, type MTCP2-015-3BD18C using a GS23-4015 VFD and he wants a master and a follower, as shown in the figure below:
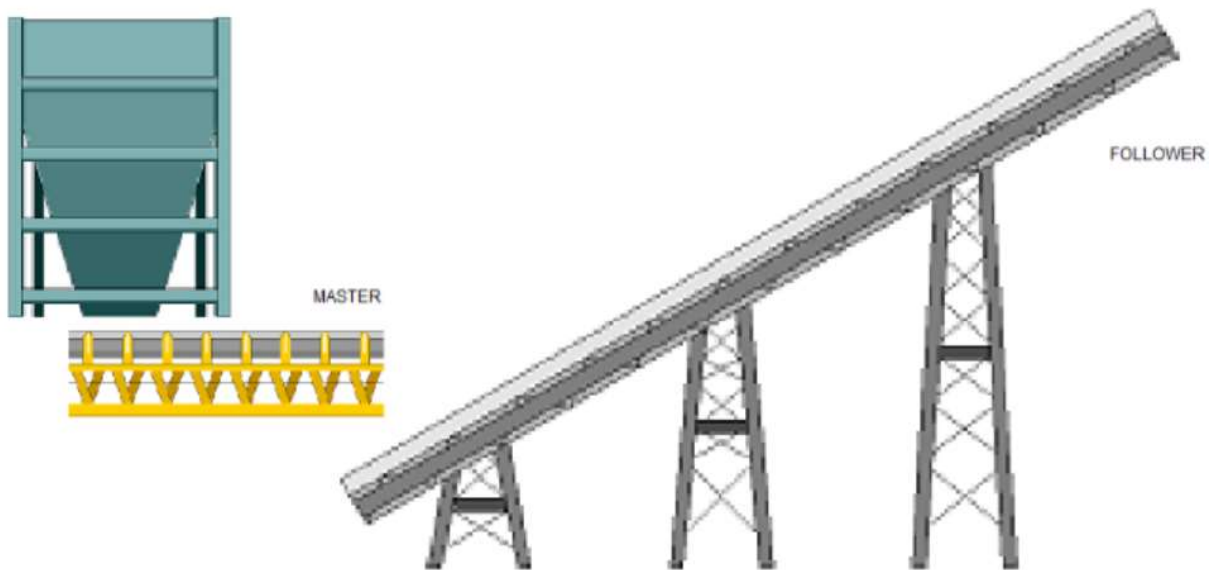
Both conveyors are engineered to move the same amount of material when in sync. The mechanical part of this example project will not be discussed in this document.

On the following pages are shown:
  a) An electrical diagram showing the wiring
  b) Parameter settings for both Master and Follower VFDs

Installation instructions and selection of enclosure & cooling are not discussed in this application note.

Wiring shown in the diagram below:

Master   *Follower*

External control equipment is shown in the list below:

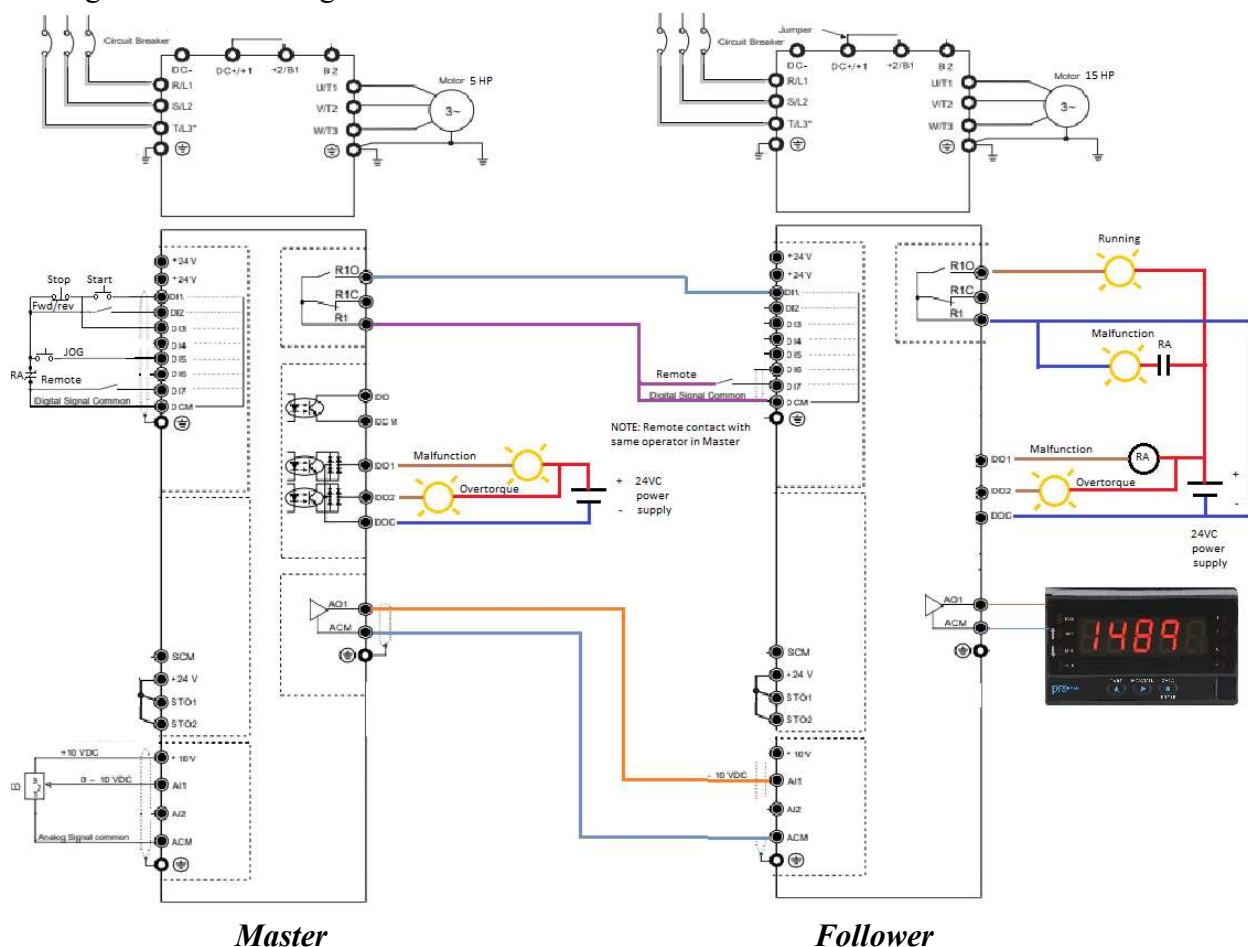| Part #	Description	Purpose
GCX1102	Pushbutton, momentary, 1 N.O. contact, green operator	Start master
GCX1101	Pushbutton, momentary, 1 N.C. contact, red operator	Stop master
GCX1100	Pushbutton, momentary, 1 N.O. contact, black operator	JOG master
GCX1300	2 pos selector switch, 1 N.O contact, maintained	Select local-remote
ECX2300-5K	5 Kohm potentiometer	Motor speed control
ECX2640	Legend plate for item above	
GCX1232-24L	LED pilot light 24VDC, 22 mm, green	To indicate Running
GCX1231-24L	LED pilot light 24VDC, 22 mm, red	To indicate a Fault
GCX1233-24L	LED pilot light 24VDC, 22 mm, yellow	To indicate over-torque
781-1C-24D	Relay, RA	
781-1C-SKT	Socket for above relay	
DPM3-AT-A-L	Digital display panel	To indicate rpm

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After wiring you can proceed to set the parameters.

Before programming, reset the drives to default condition with P00-02 set to 10 with the keypad.

Parameter settings for Master:

Parameter	Description	Value
P00-11	Speed control mode	0
Control mode is Volt/Hz		
P00-16	Load selection	1
Constant Torque (CT): overload rated output current 200% in 3 seconds. (150%,1 minute)		
P00-20	Frequency reference source in REMOTE	2
External analog input 0-10 Volt		
P00-21	Operation command source in REMOTE	1
Start/stop with terminals		
P00-29	Local/remote selection	4
When switching between local and remote, the drive runs with LOCAL settings when switched to Local and runs with REMOTE settings when switched to Remote for frequency and operating status.		
P00-30	Freq command in LOCAL	7
Using the keypad potentiometer		
P00-31	start/stop command source LOCAL	0
Start/stop using the keypad pushbuttons		
P01-00	Maximum operation frequency	60
This is the upper limit of the VFD operation frequency		
P01-01	Motor base frequency	60
Motor nameplate frequency		
P01-02	Motor nameplate voltage	460
Motor nameplate Voltage		
P02-00	Wiring for start	3
Three-wire operation method		
P02-01	DI1 function	0
Controlled by Three-wire operation method selected in P02-00		
P02-02	DI2 function	0
Controlled by Three-wire operation method selected in P02-00		
P02-03	DI3 function	0
Controlled by Three-wire operation method selected in P02-00		
P02-04	DI4 function	0
No function		
P02-05	DI5 JOG	6
Jog external pushbutton input		
P02-06	DI6 function	0
No function		

P02-07	DI7 Local/Remote Selection	56

When this input is ON, the condition is Local

P02-13	R1 function	1

Output indicating the VFD is running

P02-16	DO1 function	11

Output indicating the VFD got a malfunction

P02-17	DO2 function	7

Output indicating the VFD got an over-torque (See P06.06 to P6-08)

P3-00	AI1 analog input selection	1

AI1 has the function of frequency reference

P3-01	AI2 analog input selection	0

AI2 has no function

P03-20	A01 function	0

Function as output frequency to be the frequency reference for the follower

P03-28	AI1 input selection	0

Signal selected as unipolar 0-10 VDC.

P03-39	VR input selection	1

Signal selected as unipolar 0-10 VDC for use with the potentiometer.

P03-41	VR positive	0

No bias in the potentiometer

P05-01	Rated current of Motor (Nameplate data)	7.27 amps

Motor FLA 7.27

P05-03	Rated motor speed in rpm	1175 rpm

From motor nameplate

P6-01	Overvoltage stall prevention	0

Disabled function

P06-06	Over-torque selection	1

Continue operation after over-torque detection during constant speed operation

P06-07	Over-torque level	81 %

100% is the drive current (9A)

P06-08	Over-torque detection time	1 s

Time to detect over-torque

P06-13	Thermal relay selection	1

Motor with shaft driven cooling fan

Parameter settings for Follower:

Parameter	Description	Value
P00-11	Speed control mode	0
Control mode is Volt/Hz		
P00-16	Load selection	1
Constant Torque (CT): overload rated output current 200% in 3 seconds. (150%,1 minute)		
P00-20	Frequency reference source in REMOTE	2
External analog input 0-10 Volt		
P00-21	Operation command source in REMOTE	1
Start/stop with terminals		
P00-29	Local/remote selection	4
When switching between local and remote, the drive runs with LOCAL settings when switched to Local and runs with REMOTE settings when switched to Remote for frequency and operating status.		
P00-30	Freq command in LOCAL	7
Using the keypad potentiometer		
P00-31	start/stop command source LOCAL	0
Start/stop using the keypad pushbuttons		
P01-00	Maximum operation frequency	60
This is the upper limit of the VFD operation frequency		
P01-01	Motor base frequency	60
Motor nameplate frequency		
P01-02	Motor nameplate voltage	460
Motor nameplate Voltage		
P02-00	Wiring for start	1
Two-wire operation method		
P02-01	DI1 function	0
Controlled by Two-wire operation method selected in P02-00		
P02-02	DI2 function	0
Controlled by Two-wire operation method selected in P02-00		
P02-03	DI3 function	0
No function		
P02-04	DI4 function	0
No function		
P02-05	DI5 JOG	6
Jog external pushbutton input		
P02-06	DI6 function	0
No function		
P02-07	DI7 Local/Remote Selection	56
When this input is ON, the condition is Local		
P02-13	R1 function	1
Output indicating the VFD is running		

P02-16	DO1 function	11

Output indicating the VFD got a malfunction; This stops the master also in case of failure

P02-17	DO2 function	7

Output indicating the VFD got an over-torque (See P06.06 to P6-08)

P3-00	AI1 analog input selection	1

AI1 has the function of frequency reference

P3-01	AI2 analog input selection	0

AI2 has no function

P03-20	A01 function	0

Function as output frequency to be the frequency input to the Digital Panel Display

P03-28	AI1 input selection	0

Signal selected as unipolar 0-10 VDC

P03-39	VR input selection	1

Signal selected as unipolar 0-10 VDC for use with the potentiometer

P03-41	VR positive	0

No bias in the potentiometer

P05-01	Rated current of Motor (Nameplate data)	18.1 amps

Motor FLA 18.1A

P05-03	Rated motor speed in rpm	1765 rpm

From motor nameplate

P6-01	Overvoltage stall prevention	0

Disabled function

P06-06	Over-torque selection	1

Continue operation after over-torque detection during constant speed operation

P06-07	Over-torque level	72.4%

100% is the drive current (25.0 A)

P06-08	Over-torque detection time	1 s

Time to detect over-torque

P06-13	Thermal relay selection	1

Motor with shaft driven cooling fan

When in Local, the control of the output frequency is done with the keypad potentiometer as well as the keypad start and stop pushbuttons

Technical Assistance: If you have questions regarding this Application Note, please contact us at 770-844-4200 for further assistance.