

**Signal list for wind power plants - TR 3.2.5:2015**
**Revision: 1 date: 07.01.2015**

Rated output													
A	B	C	D	Signal description	Comments	Possible interval	Recommended value	Unit	Type of data	Purpose	Typical operator	Typical user	Energinet.dk reference
		X	X	Grid disconnection in POC Swich gear status in plant infrastructure	Open/closed	Open/closed	-	-	Status	Monitor coupling state for wind power plants and infrastructure of units/plants	-	PBR, Electricity supply undertaking	TR 5.8.1
		X	X	Active power supplied by wind power station in POC	Active power control	0 - P <sub>n</sub>	-	kW	Metering	Input for active power regulation	-	PBR, Electricity supply undertaking	TR 5.8.1
		X	X	Active power regulation - activated/deactivated	Active power control	Active/inactive	Active	-	Status	Monitor the electricity system	PBR	PBR, Electricity supply undertaking	TR 3.2.5
		X	X	Active power regulation - gradient for upward and downward regulation	Active power control	dP/dt	100 kW/s	kW/second	Set point	Check the speed for upward and downward regulation	PBR	PBR	TR 3.2.5
		X	X	Active power regulation - requested active power in POC	Active power control	0 - P <sub>n</sub>	-	kW	Set point	Check the active power generated by the wind power plant	PBR	PBR	TR 3.2.5
		X	X	Reactive power - import/export in POC	Active power control	Q <sub>MAX</sub> to Q <sub>MIN</sub>	-	kvar	Metering	Input for reactive power egulation	-	PBR, Electricity supply undertaking	TR 5.8.1
		X	X	Power factor - measured in POC	Reactive power control	0 - 1	-	-	Metering	Input for reactive power regulation	-	PBR, Electricity supply undertaking	TR 3.2.5
		X	X	Power factor - requested power factor in POC	Reactive power control	0 - 1	1	-	Set point	Power factor control	Electricity supply undertaking	PBR, Electricity supply undertaking	TR 3.2.5
		X	X	Reactive power regulation - activated/deactivated	Reactive power control	Active/inactive	Active	-	Status	Monitor control for reactive compensation	PBR	PBR	TR 3.2.5
		X	X	Reactive power regulation - requested reactive power in POC	Reactive power control	Q <sub>MAX</sub> to Q <sub>MIN</sub>	0	kvar	Set point	Mvar control	PBR	PBR	TR 3.2.5
		X	X	Voltage in the voltage reference point	Voltage control	0 - U <sub>C</sub> +15%	-	V	Metering	Input for voltage control in POC	Electricity supply undertaking	PBR, Electricity supply undertaking	TR 5.8.1
		X	X	Voltage control - active/inactive	Voltage control	Active/inactive	Inactive	-	Status	Monitor voltage control	Electricity supply undertaking	PBR, Electricity supply undertaking	TR 3.2.5
		X	X	Voltage in voltage reference point	Voltage control	0 - U <sub>C</sub> +15%	-	V	Metering	Monitor voltage mode in wind power plant	-	PBR, Electricity supply undertaking	TR 3.2.5
		X	X	Voltage control - droop for voltage control	Voltage control	2 - 8%	6%	% of U <sub>n</sub>	Set point	Droop for voltage control in the voltage reference point	Electricity supply undertaking	PBR, Electricity supply undertaking	TR 3.2.5
		X	X	Voltage regulation - requested voltage in the voltage reference point	Voltage control	U <sub>C</sub> +/-10%	-	V	Set point	Voltage control	Electricity supply undertaking	PBR, Electricity supply undertaking	TR 3.2.5
X	X	X	X	Frequency response - activated/deactivated	Frequency response	Active/inactive	-	-	Status	Provide frequency support in overfrequency	-	PBR, Electricity supply undertaking	TR 3.2.5
X	X	X	X	Frequency response - start frequency for downward regulation - f <sub>R</sub>	Frequency response	50.000 - 52.000	51.5	Hz	Set point	Provide frequency support in overfrequency	-	PBR, Electricity supply undertaking	TR 3.2.5
X	X	X	X	Frequency response - droop for downward regulation from f <sub>R</sub>	Frequency response	0 - 100%	40%	% of P <sub>n</sub> /Hz	Set point	Provide frequency support in overfrequency	-	PBR, Electricity supply undertaking	TR 3.2.5
		X	X	Frequency control - activated/deactivated	Frequency control	Active/inactive	-	-	Status	Monitor frequency control	-	PBR, Electricity supply undertaking	TR 3.2.5
		X	X	Frequency control - regulation limit - low frequency	Frequency control	46.50 - 47.50	47.0	Hz	Set point	Lower control limit value for frequency control	PBR	PBR, Electricity supply undertaking	TR 3.2.5
		X	X	Frequency control - regulation limit - high frequency	Frequency control	51.5 - 53	52.0	Hz	Set point	Upper control limit value for frequency control	PBR	PBR, Electricity supply undertaking	TR 3.2.5
		X	X	Frequency control - regulation reserve - P <sub>delta</sub>	Delta control	0 - P <sub>n</sub>	20% of P <sub>n</sub>	kW	Set point	Input for frequency control in POC	PBA	PBR, Electricity supply undertaking	TR 3.2.5
		X	X	Frequency control - start frequency for control band - f <sub>1</sub>	Frequency control	49.750 - 50.00	49.8	Hz	Set point	Input for frequency control in POC	PBR	PBR, Electricity supply undertaking	TR 3.2.5
		X	X	Frequency control - droop for upward regulation from f <sub>2</sub> to f <sub>1</sub>	Frequency control	0 - 50%	4%	% of P <sub>n</sub> /Hz	Set point	Input for frequency control in POC	PBR	PBR, Electricity supply undertaking	TR 3.2.5
		X	X	Frequency control - start frequency for dead band - f <sub>2</sub>	Frequency control	49.800 - 50.000	49.88	Hz	Set point	Input for frequency control in POC	PBR	PBR, Electricity supply undertaking	TR 3.2.5
		X	X	Frequency control - end frequency for dead band - f <sub>3</sub>	Frequency control	50.000 - 50.200	50.02	Hz	Set point	Input for frequency control in POC	PBR	PBR, Electricity supply undertaking	TR 3.2.5
		X	X	Frequency control - end frequency for control band - f <sub>4</sub>	Frequency control	50.000 - 50.250	50.2	Hz	Set point	Input for frequency control in POC	PBR	PBR, Electricity supply undertaking	TR 3.2.5
		X	X	Frequency control - end frequency for regulation up to f <sub>5</sub>	Frequency control	50.000 - 51.700	50.5	Hz	Set point	Input for frequency control in POC	PBR	PBR, Electricity supply undertaking	TR 3.2.5
		X	X	Frequency control - droop for downward regulation from f <sub>4</sub> to f <sub>5</sub>	Frequency control	0 - 50%	6%	% of P <sub>n</sub> /Hz	Set point	Input for frequency control in POC	PBR	PBR, Electricity supply undertaking	TR 3.2.5
		X	X	Frequency control - end frequency for regulation up to f <sub>6</sub>	Frequency control	51.100 - 50.300	50.2	Hz	Set point	Input for frequency control in POC	PBR	PBR, Electricity supply undertaking	TR 3.2.5
		X	X	Frequency control - droop for downward regulation from f <sub>5</sub> to f <sub>6</sub>	Frequency control	0-50%	6%	% of P <sub>n</sub> /Hz	Set point	Input for frequency control in POC	PBR	PBR, Electricity supply undertaking	TR 3.2.5
		X	X	Frequency control - frequency limit for reclosure if active power is reduced to below P <sub>min</sub> - f <sub>7</sub>	Frequency control	50.000 - 50.100	50.05	Hz	Set point	Input for frequency control in POC	Electricity supply undertaking	PBR, Electricity supply undertaking	TR 3.2.5
		X	X	P <sub>min</sub>	Frequency control	0 - 20%	10%	-	Set point	Lower limit for frequency control in POC	PBR	PBR, Electricity supply undertaking	TR 3.2.5
		X	X	System protection	Protection	Active/inactive	Inactive	-	Control	Activation/deactivation of system protection feature	Electricity supply undertaking	PBR, Electricity supply undertaking	TR 3.2.5
X	X	X	X	Stop signal	Protection	Active/inactive	Inactive	-	Control	Activation/deactivation of stop signal	Electricity supply undertaking	PBA, Electricity supply undertaking	TR 3.2.5
X	X	X	X	On hold signal - released for start	Protection	Active/inactive	Inactive	-	Control	Activation/deactivation of reclosure	Electricity supply undertaking	PBR, Electricity supply undertaking	TR 3.2.5